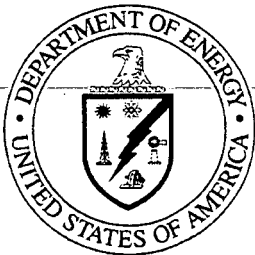
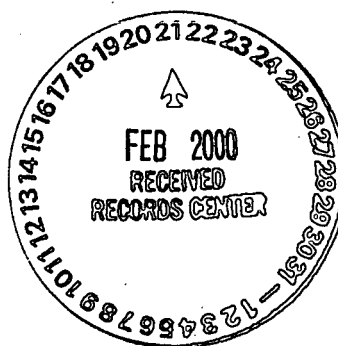


**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE  
QUARTERLY  
ENVIRONMENTAL MONITORING REPORT  
JULY - SEPTEMBER 1999**



US Department of Energy, Rocky Flats Field Office  
10808 Highway 93, Unit A  
Golden, CO 80403-8200



**NOVEMBER 1999**

RF/RMRS-99-465.UN

**ADMIN RECORD**  
SW-A-003957

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**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE  
QUARTERLY  
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JULY - SEPTEMBER 1999**

**PREPARED BY ROCKY MOUNTAIN REMEDIATION SERVICES, L.L.C.**

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*THE DATA IN THIS DOCUMENT MAY BE PRELIMINARY AND COULD CHANGE AFTER THE  
DATA HAVE BEEN VERIFIED OR VALIDATED.*

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**NOVEMBER 1999  
RF/RMRS-99-465.UN**

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## **HIGHLIGHTS FOR JULY - SEPTEMBER 1999**

This report is produced and distributed quarterly as part of our ongoing Agreement in Principle and as a forum for the Rocky Flats Cleanup Agreement (RFCA) quarterly monitoring requirement. As discussed at a recent Exchange of Information Meeting, the Site is consolidating its reporting for selected media. In an effort to provide a more meaningful interpretation of the data presented and to save some natural resources, namely trees, the Site will be providing analytical data in the following formats.

Airborne effluent data is represented by a single graph providing cumulative plutonium emissions for 1997 and 1998. Ambient air data is represented by two graphs – a summary of estimated off-site dose as compared to a 10 Mrem per year standard, and air concentrations at perimeter sample locations expressed as a percentage of EPA's air concentration-based dose limit for members of the public. Meteorological data are represented by one windrose and a climatic summary for each month in the reporting period.

Compliance data in support of the Site National Pollutant Discharge Elimination System (NPDES) permit are presented for the reporting period. Analytical data collected in support of RFCA will include the following locations: GS01, GS03, GS08, GS10, GS11, GS31, GS43, SW022, SW027, SW091, and SW093. Data include the hydrograph, mean daily flow and available water quality measurements for each location during the reporting period. Additional surface water locations supporting the Industrial Area Interim Measures/Interim Remedial Action (IA IM/IRA) program are GS27, GS32, GS39 and GS40 and are presented in the same manner as RFCA locations. Other stations may appear or be deleted, as performance monitoring locations are added or dropped, as well as any new source detection locations that may be required. Some locations, like GS32, have no flow monitoring capabilities and only analytical data are provided. An additional section provides quarterly summary information for the Incidental Waters program.

### **Airborne Effluent**

Complete isotopic analytical data through August 1999 are included in this report. Data for September 1999 are not complete at this time. All data are within the normally observed ranges of concentrations for their respective locations.

Effluent sampling in the Building 779 cluster was ceased on August 2, in accordance with agreed protocols under the Ambient Monitoring agreement with both EPA and CDPHE. Tritium data from August are missing two sample results due to insufficient bubbler volumes to adequately quantify the effluent air.

Consistent with all other uses of these data, positive values only are included in the total release calculation (the negative values are treated as zeros). The uncertainty calculation does reflect all values.

## **Ambient Air**

Complete isotopic analytical data through August 1999 for coarse (>10 micrometers) and fine (<10 micrometers) ambient particles are included in this report. All data are within the normally observed ranges of concentrations for their respective locations. Data for September 1999 are not complete at this time.

During the months of March, April, and May, some of the oil from the impactor pads dripped onto the fiberglass filters. The specific samples are from the following locations:

March - S-142

April - S-142 and S-207

May - S-140 and S-207

The isotopic results from the above samples are included in the data summary. These sample results should be representative of the air sampled even though the oil did migrate. Excess oil is known to collect near the edges of the impactor substrate, out of the sampled air stream. Should this oil be carried over to the filter substrate, it would be reasonable to expect that very little contaminant is associated with it. Small traces of oil will not interfere significantly with the analysis method.

## **Meteorology and Climatology**

Meteorological data are routinely measured from instruments on a 61-meter tower located in the west buffer zone at an elevation of 1,870 meters (6,140 feet) above sea level. All meteorological data are collected on a real-time basis and are transmitted as 15-minute averaged values to the Computer Assisted Protective Action Recommendations System (CAPARS) model for emergency response purposes. The same data are logged at the tower and downloaded for air quality and surface water modeling purposes.

Climatic summaries and Windroses for July through September 1999 are included in this report.

As a result of the new protocols used to validate the meteorological data, each 15-minute averaged observation is validated, rather than the entire observation record for the same time period (which might contain 70 different observations-i.e. temperature, wind speed, etc.). Missing data are reported with respect to the wind speed and wind direction values, for example, rather than recording all observations missing for the same 15 minute period. There were two hours of missing wind speed/direction data for the month of August; there were no other missing wind speed/direction data for this time period.

## **Surface Water**

Surface water analytical data collected during fourth quarter of FY 99 (July, August, and September) for NPDES/FFCA permit compliance are presented in this report. All reported data are consistent with historical measurements and within permit limitations.



On September 14, 1999, the Site identified a leak in the pipeline that conveys the Sewage Treatment Plant effluent to Pond B-3. Water leaking from the pipeline flows around Pond B-3 and enters Pond B-4, by-passing the authorized outfall. EPA was notified via telephone of this condition on September 14, 1999 by DOE as required by the permit and written notification followed within 5 business days. As the pipeline is located in Preble's Meadow Jumping Mouse habitat, the Site consulted with the U.S. Fish & Wildlife Service (USFWS) as required by the Endangered Species Act. As part of the consultation process, a site visit was performed by the USFWS on October 12, 1999 and DOE/RFFO has made a "no effect" determination, submitted the plans for repair, and USFWS has provided concurrence. Repairs to the pipeline have been initiated, but are proceeding slowly as receipt of the necessary parts have been delayed. On November 4, 1999 a root blockage was removed from the pipeline and it appears that there is little or no water by-passing Pond B-3 at this time. However, once repairs begin, some water may again bypass Pond B-3. It is expected that the necessary supplies will be available by the later part of November and repairs will resume at that time. The Site continues to provide updates to EPA as to the progress of repairs on an as needed basis or in the current Discharge Monitoring Report.

Included in this report are two surface water locations that monitor the Mound Site area. These locations are SW061 and SW132 and are sampled quarterly for isotopic Pu/Am, selected total and dissolved metals and EPA VOA Method 8260.

#### **Hydrologic Monitoring and Rocky Flats Cleanup Agreement (RFCA) Monitoring**

All available analytical data collected during fourth quarter of FY 99 (July, August, and September) from samples supporting RFCA and Hydrologic Monitoring programs are included in this report.

#### **Incidental Water Monitoring**

A summary of Incidental Waters dispositioned during fourth quarter of FY99 (July, August, and September) are presented in this report.

## 1. AIR DATA

### 1.1 EFFLUENT AIR DATA

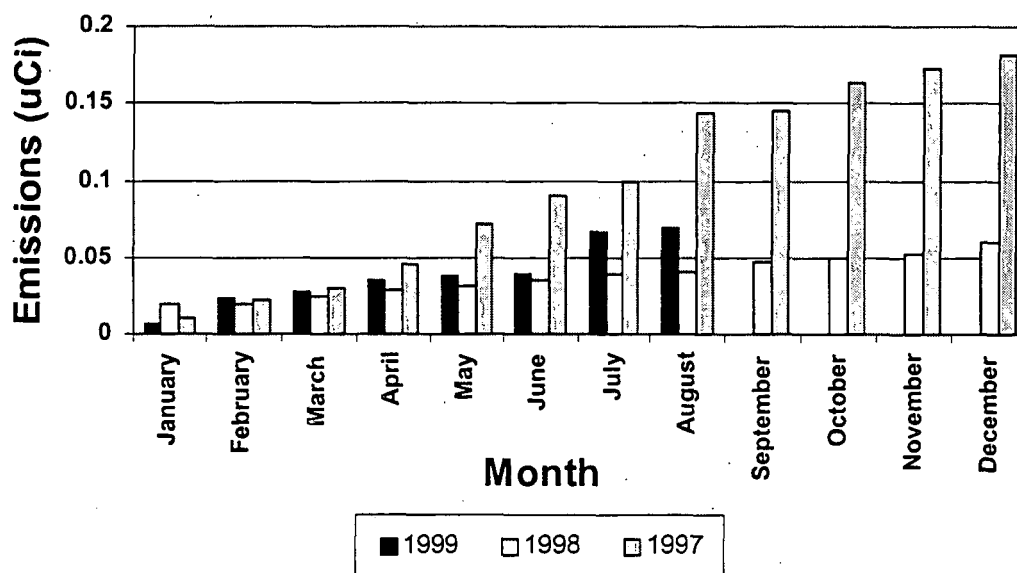
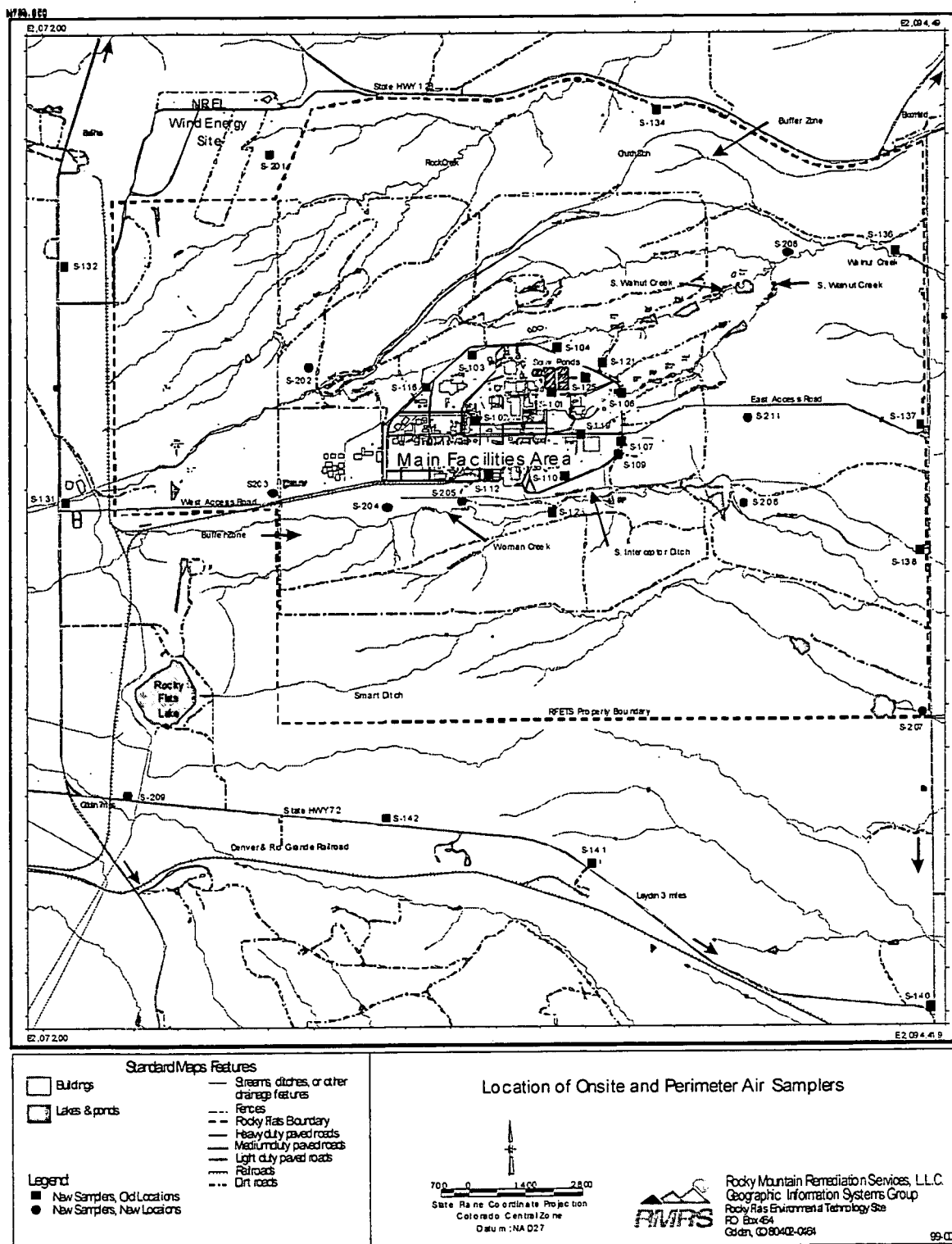


Figure 1-1. Cumulative Plutonium Airborne Effluent Emissions

The above graph shows the cumulative airborne effluent emissions of plutonium from building stacks. June, July, and August 1999 emissions are consistent with previously measured plutonium concentrations, with an August cumulative, year-to-date plutonium emission of 0.07 microcuries (uCi).

Americium and uranium emissions are also within the ranges seen in 1997 and 1998. The monthly tritium airborne effluent emissions for January through August 1999 are below the mean monthly emissions in 1998.

Map 1-1. Location of Onsite and Perimeter Air Samplers



## 1.2 AMBIENT AIR DATA

### 1.2.1 Perimeter Sampler Locations

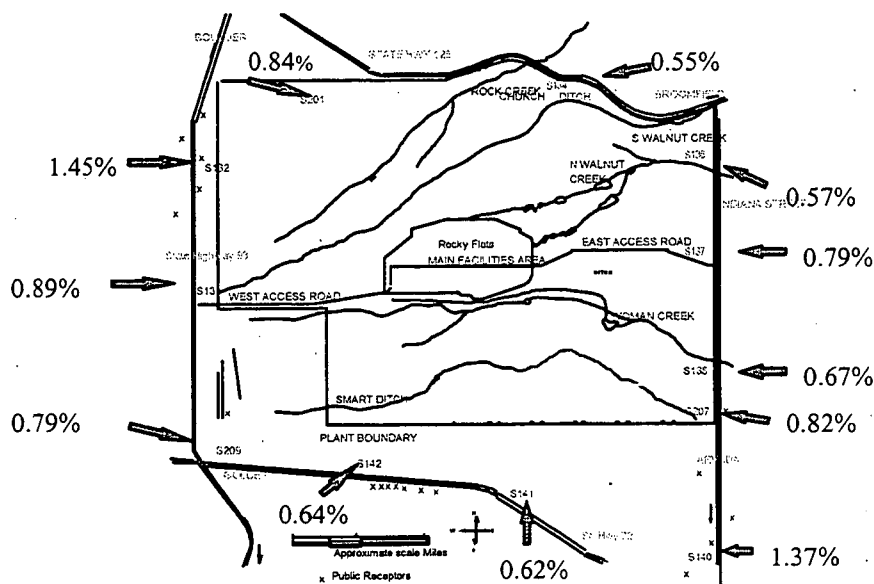


Figure 1-2. Perimeter Samplers Dose Map

The above map illustrates the perimeter Radioactive Ambient Air Monitoring Program (RAAMP) sampler locations and the twelve-month rolling-average maximum potential dose through August 1999, expressed as a percentage of EPA's air concentration-based dose limit for members of the public.

The percentages include the naturally occurring uranium isotopes as well as the isotopes from site contributions. The average concentration observed at location S-132 is projected to equate to the highest dose, as we have typically seen in the past. The dose percentage for location S-132 is estimated; laboratory results and comparisons of fine and coarse particle concentrations suggest that the analytical results of the February fiberglass filter from S-132 and S-107 were mixed up in the reporting process.

The percentage values are based on the measured air concentrations, averaged over the year, converted as a percent of the Rad NESHAP concentration limits.

### 1.2.2 Perimeter Sampler Locations – Dose Rate Graphs

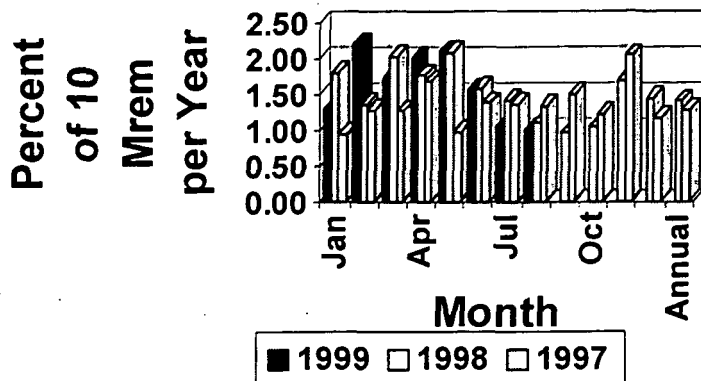


Figure 1-3. Offsite Dose Rate Summary

The above graph illustrates the monthly estimated maximum potential dose rates at the perimeter sampler showing highest radionuclide concentrations, including contributions from naturally occurring uranium isotopes. All of the highest dose rates were seen at either location S-132 or S-140, except for March 1999 where S-209 showed the highest dose rate. The monthly dose rates were less than 2.5 percent of the 10 mrem standard.

### 1.2.2 Perimeter Sampler Locations – Dose Rate Graphs, continued

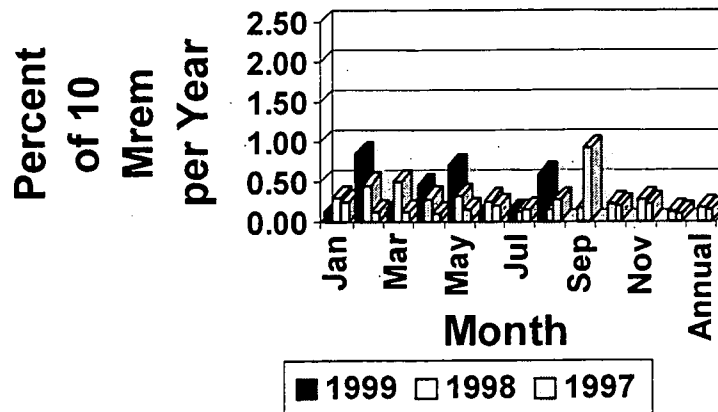


Figure 1-4. Offsite Dose Rate Summary Without U-234 and U-238

Omitting the uranium 234 and 238 contributions may better reflect the contribution from Site operations. This presentation results in an estimated maximum potential dose rate of less than 0.9% of the concentration limits.

Ambient concentrations and dose rates for 1999 are similar to the rates observed in 1997 and 1998.

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## 2. METEOROLOGY AND CLIMATOLOGY

### 2.1 WIND ROSES FOR JULY, AUGUST, AND SEPTEMBER 1999

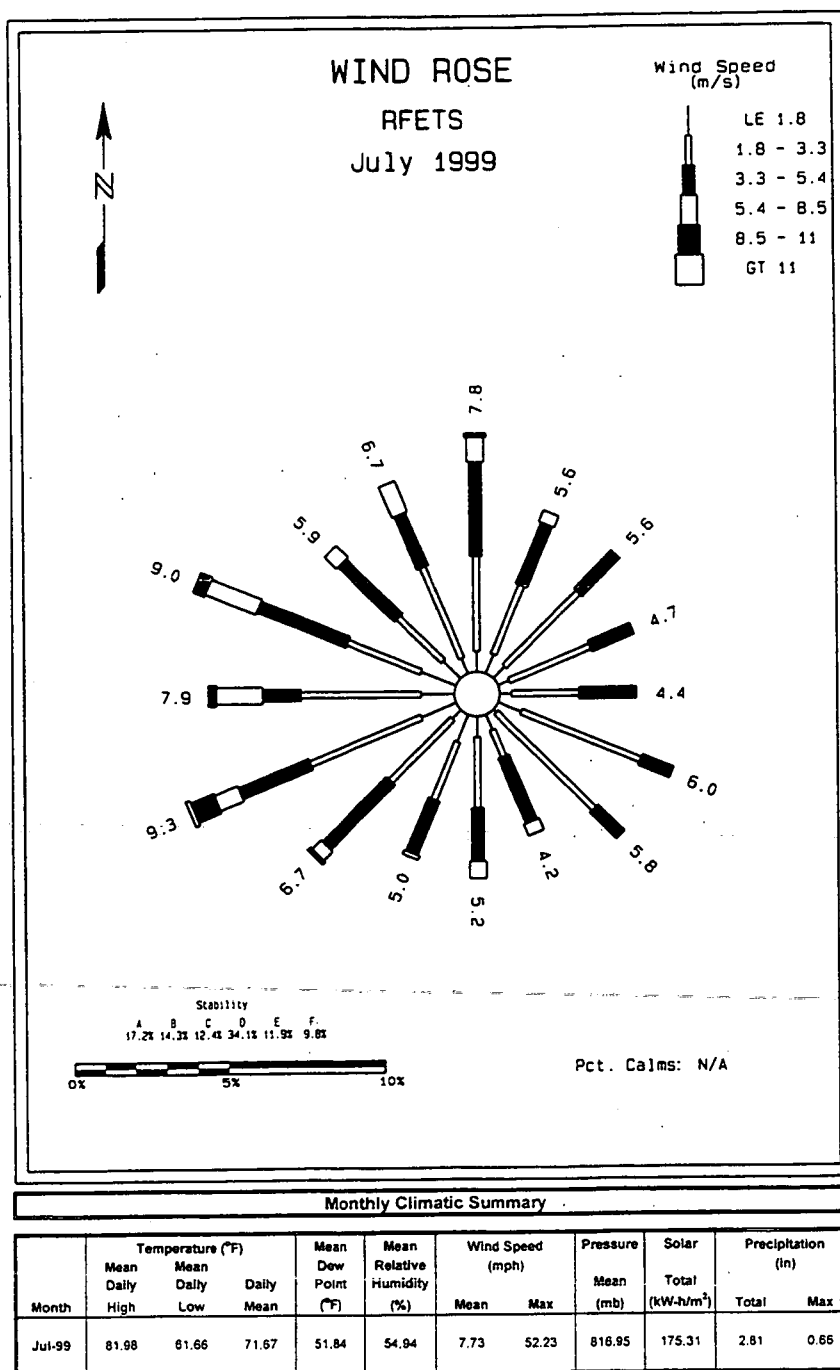


Figure 2-1. Wind Rose for Rocky Flats Environmental Technology Site for July 1999



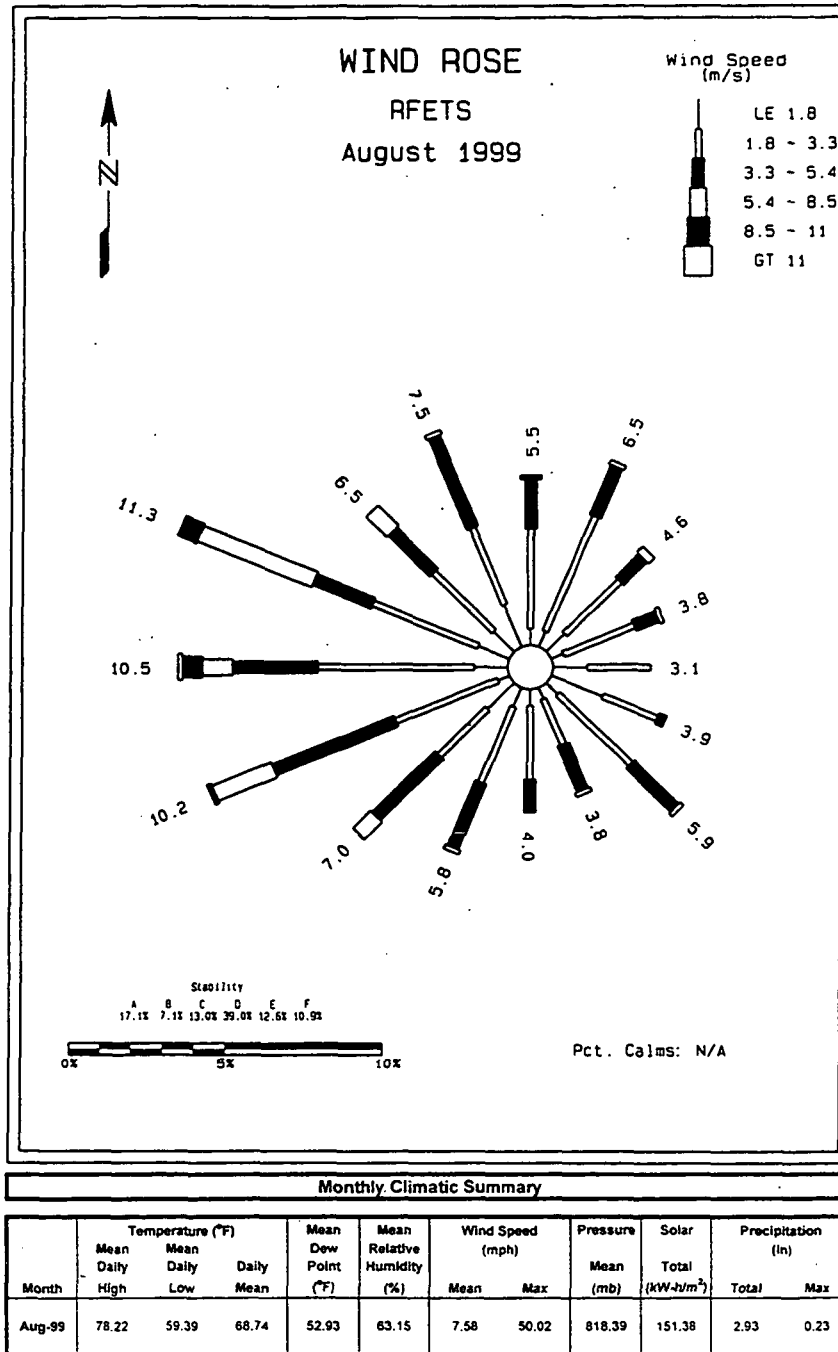


Figure 2-2. Windrose for Rocky Flats Environmental Technology Site for August 1999

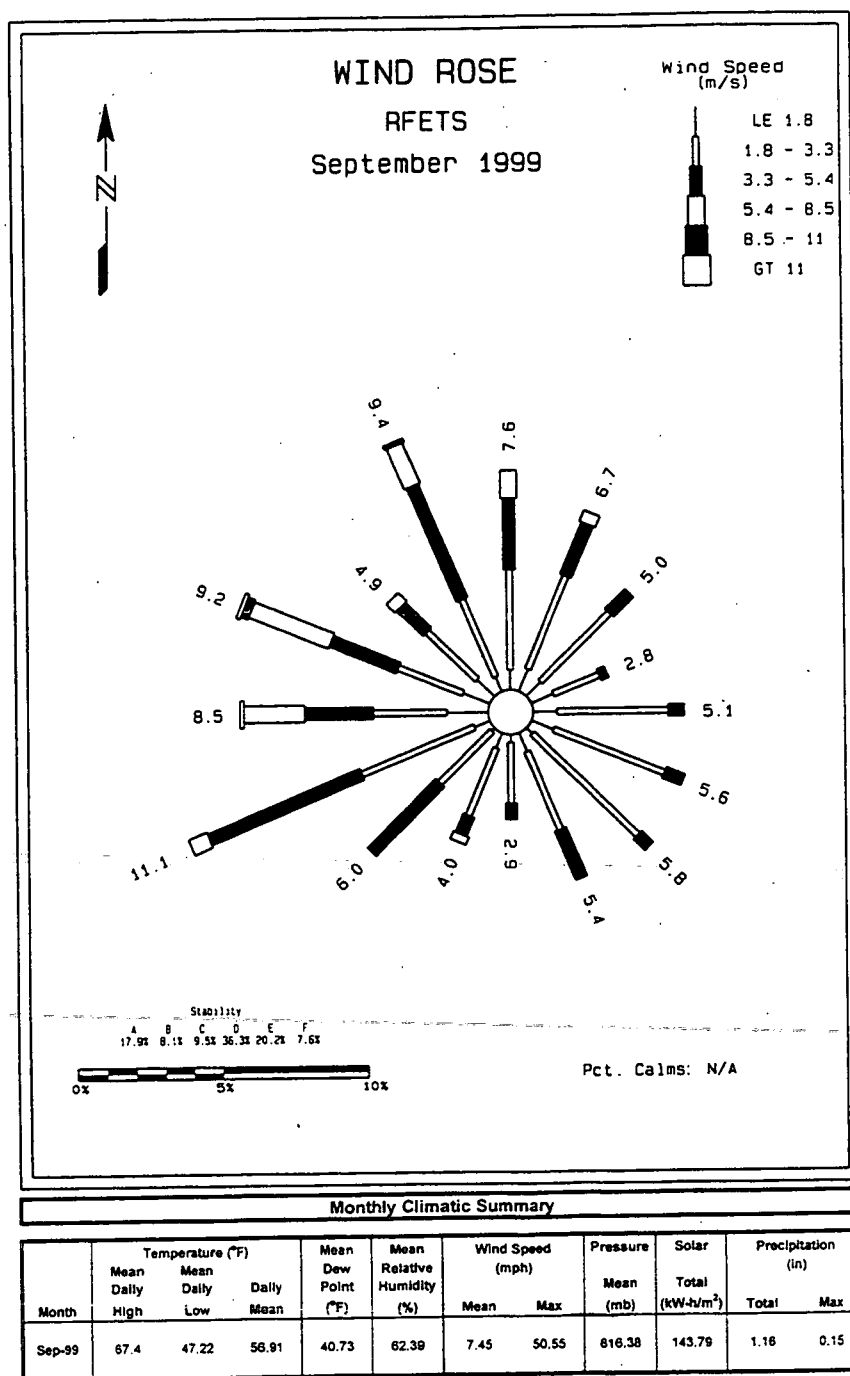
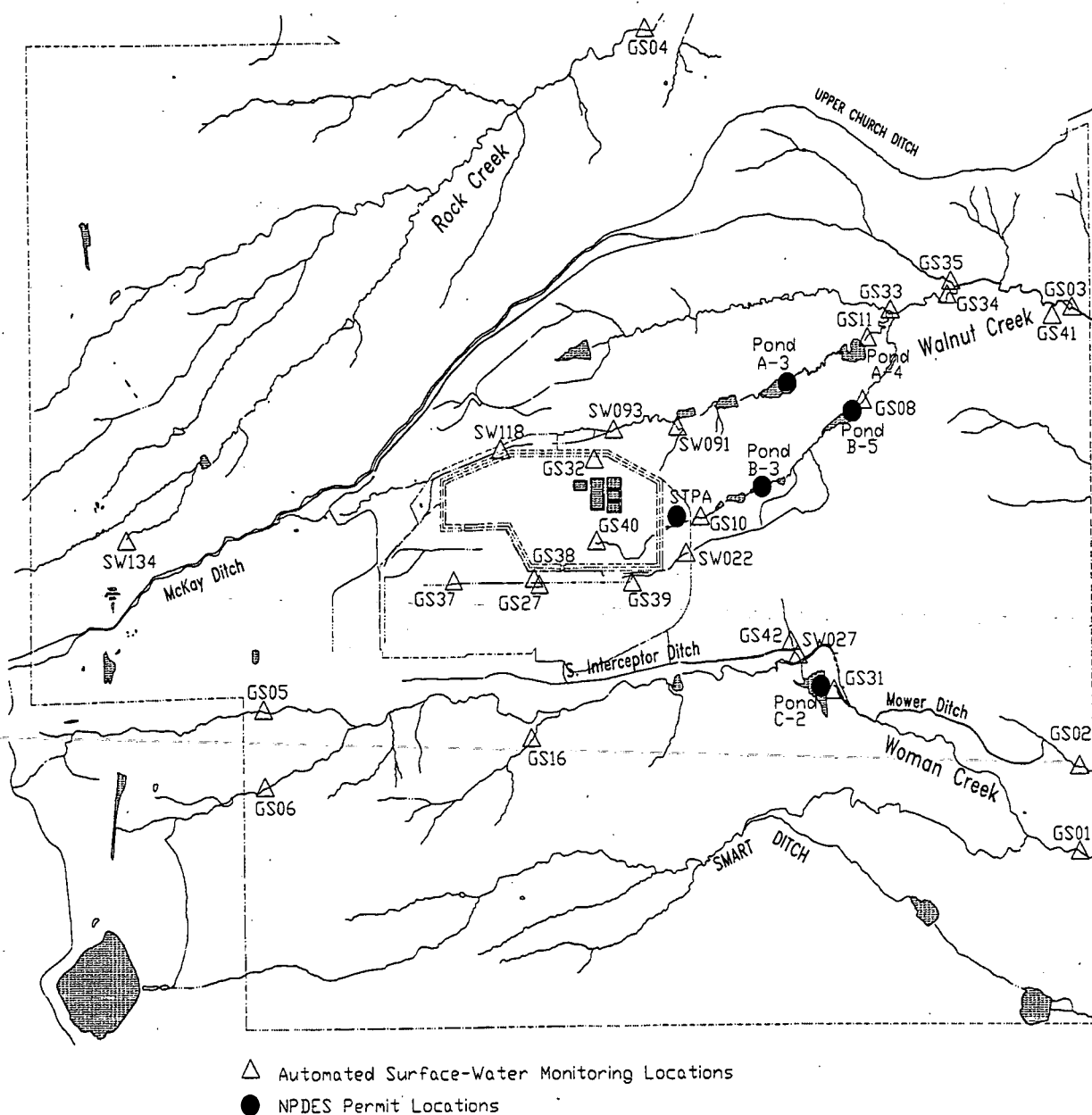


Figure 2-3. Windrose for Rocky Flats Environmental Technology Site for September 1999

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### 3. SURFACE WATER DATA

Map 3-1. Holding Ponds and Liquid Effluent Water Courses



### 3.1 NPDES SUMMARY DATA

Table 3-1. Pond B-3 (Outfall 001A)

Dates of discharge 7/1/99 – 9/30/99

Parameter & Units	Measured 30-day Average	Limit 30-Day Average	Measured 7-Day Average	Limit 7-Day Average	Measured Daily Maximum	Limit Daily Maximum
NO3/NO2, mg/l	7.1 – 8.7	10	9.0 – 12.0	20	N/A	N/A
TRC, mg/l	N/A	N/A	N/A	N/A	0.08 – 0.13	0.5
BOD5, mg/l	<2.5 – 4.4	a	N/A	N/A	4.0 – 6.0	a
CBOD5, mg/l	<2.0 – 2.2	a	N/A	N/A	3.0	a
TSS, mg/l	<22	a	N/A	N/A	<5 - 140	a

a Report Only  
 N/A Not Applicable  
 TRC Total Residual Chlorine  
 TSS Total Suspended Solids  
 BOD5 Biochemical Oxygen Demand, 5-Day Test  
 CBOD5 Carbonaceous Biochemical Oxygen Demand, 5-Day Test

Note: Results are the range of value measured during the reporting period

Table 3-2. Sewage Treatment Plant (Outfall STP A)

Dates of Discharge 7/1/99 - 9/30/99. Metals and VOA Samples Collected 7/1/99, 7/6/99, 8/3/99, 9/1/99, 9/7/99.

Parameter & Units	Measured 30-day Average	Limit 30-Day Average	Measured 7-Day Average	Limit 7-Day Average	Measured Daily Minimum	Limit Daily Minimum	Measured Daily Maximum	Limit Daily Maximum	Observed Sheen	Measured Result
pH, SU	N/A	N/A	N/A	N/A	6.3 - 7.0	6.0	7.6 - 8.1	9.0	N/A	N/A
TSS, mg/l	<5	30	<5	45	N/A	N/A	N/A	N/A	N/A	N/A
Total Phos., mg/l	2	8	N/A	N/A	N/A	N/A	3.1 - 3.3	12	N/A	N/A
TRC, mg/l	<0.03	a	0.03-0.04	a	N/A	N/A	N/A	N/A	N/A	N/A
Total Cr., ug/l	<1.0	50	N/A	N/A	N/A	N/A	<1	100	N/A	N/A
F. Coliform, #/100ml	<3	200b	<13	440b	N/A	N/A	N/A	N/A	N/A	N/A
CBOD5, mg/l	<2	10	N/A	N/A	N/A	N/A	3.0 - 5.0	25	N/A	N/A
Oil & Grease	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	c	N/A
WET										
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Antimony, ug/l	<0.62 - 0.71	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic, ug/l	<0.82 - 1.8	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium, ug/l	<0.03	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium, ug/l	<0.08 - 0.31	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper, ug/l	3.3 - 3.5	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron, ug/l	44 - 80	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead, ug/l	<0.72	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese, ug/l	13.6 - 21.0	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury, ug/l	<0.10	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel, ug/l	1.5 - 1.8	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silver, ug/l	<0.35	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc, ug/l	23.1 - 38.0	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VOC's, ug/l	d	a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

a Report Only

b Geometric Mean

c No Sheen Observed

d None Detected Above PQL

N/A Not Applicable

TSS Total Suspended Solids

TRC

CBOD5

PQL

WET

SU

Total Residual Chlorine

Carbonaceous Biochemical Oxygen Demand, 5-Day Test

Practical Quantitation Limit

Whole Effluent Toxicity

Standard Units

Table 3-3. Ponds – Interior and Terminal

Pond A-3 discharged 8/2/99 – 8/9/99; Pond A-4 discharged 8/27/99 – 9/7/99; Pond B-5 discharged 8/5/99 – 8/19/99. Pond C-2 did not discharge during the reporting period.

Location, Parameter and Units	Measured 30-day Average	Limit 30-Day Average	Measured 7-Day Average	Limit 7-Day Average	Measured Daily Minimum	Limit Daily Minimum	Measured Daily Maximum	Limit Daily Maximum	Measured Result
Pond A-3 (Outfall 002) pH, SU	N/A	N/A	N/A	N/A	7.6	6.0	9.0	9.0	N/A
NO3/NO2, mg/l	0.17	10	N/A	N/A	N/A	N/A	0.36	20	N/A
Pond A-4 (Outfall 005A) Total Cr., ug/l	N/A	N/A	N/A	N/A	N/A	N/A	<2.5	50	N/A
WET									
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Pond B-5 (Outfall 006A) Total Cr., ug/l	N/A	N/A	N/A	N/A	N/A	N/A	<1	50	N/A
WET									
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
NO3/NO2, mg/l*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pond C-2 (Outfall 007A) Total Cr., ug/l	N/A	N/A	N/A	N/A	N/A	N/A		50	N/A
WET									
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

- Sample and analysis required only if Pond B-3 is bypassed
- N/A Not applicable
- SU Standard units
- TRC Total residual chlorine
- WET Whole Effluent Toxicity

### 3.2 MOUND PLUME SUMMARY DATA

Table 3-4. Mound Plume Locations SW061 and SW132

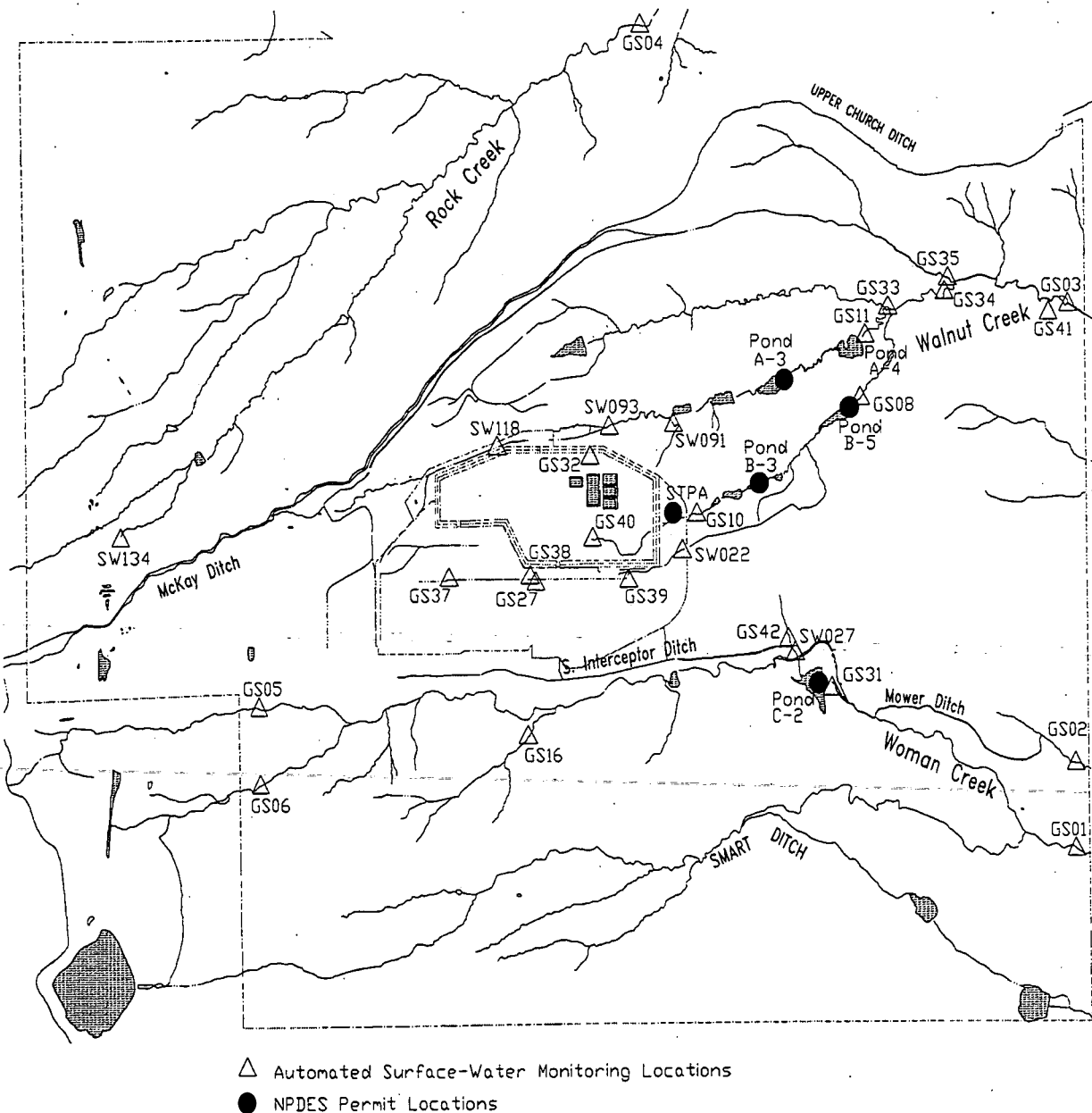
Analyte	SW061	SW132
	8/24/99	8/24/99
Pu 239/240, pCi/l	-0.004	0.038
Am 241, pCi/l	0.023	0.021
Silver, dissolved, ug/l	0.45	<0.25
Aluminum, total, ug/l	86.5	39.6
Arsenic, total, ug/l	1.3	0.92
Barium, total, ug/l	218	89.0
Beryllium, total, ug/l	<0.02	<0.02
Cadmium, dissolved, ug/l	0.32	<0.08
Copper, dissolved, ug/l	1.7	2.3
Iron, total, ug/l	329	86.9
Mercury, total, ug/l	<0.10	<0.10
Manganese, total, ug/l	39.3	31.7
Nickel, dissolved, ug/l	2.1	0.98
Lead, dissolved, ug/l	0.62	<0.52
Antimony, total, ug/l	<0.62	4.5
Selenium, dissolved, ug/l	<0.92	2.0
Zinc, dissolved, ug/l	15.4	49.6
EPA VOA Method 8260, compounds found >RFCA Seg 5 Action Level	None detected	None detected

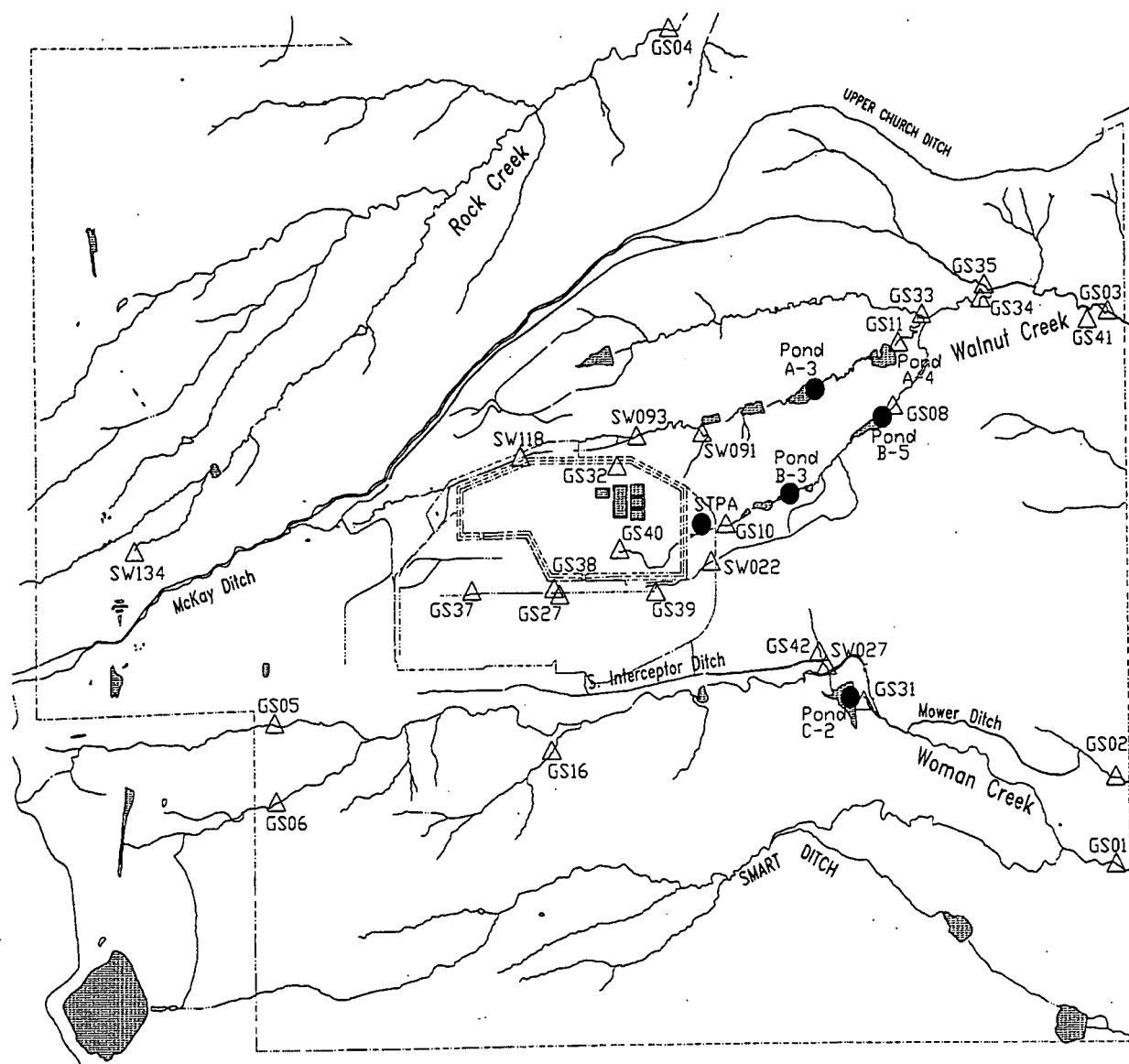


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## 4. HYDROLOGIC AND ROCKY FLATS CLEAN-UP AGREEMENT (RFCA) DATA

Map 4-1. Gaging Station Locations





- △ Automated Surface-Water Monitoring Locations  
● NPDES Permit Locations

#### 4.1 FLOW MONITORING

Table 4-1. Gaging Station GS01: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.000	0.000	0.000
2	0.000	0.000	0.000
3	0.000	0.000	0.000
4	0.000	0.001	0.000
5	0.000	8.722	0.000
6	0.000	0.948	0.000
7	0.000	0.318	0.000
8	0.000	0.096	0.000
9	0.000	0.034	0.000
10	0.000	0.025	0.000
11	0.000	0.045	0.000
12	0.000	0.037	0.000
13	0.000	0.022	0.000
14	0.000	0.013	0.000
15	0.000	0.007	0.000
16	0.000	0.000	0.000
17	0.000	0.000	0.000
18	0.000	0.000	0.000
19	0.000	0.000	0.000
20	0.000	0.000	0.000
21	0.000	0.000	0.000
22	0.000	0.000	0.000
23	0.000	0.000	0.000
24	0.000	0.000	0.000
25	0.000	0.000	0.000
26	0.000	0.000	0.000
27	0.000	0.000	0.000
28	0.000	0.000	0.000
29	0.000	0.000	0.000
30	0.000	0.000	0.000
31	0.000	0.000	NA
Monthly Average (cfs)	0.000	0.331	0.000

#### Monthly Discharge

Cubic Feet	23	887338	36
Gallons	171	6637748	269
Acre-Feet	0.00	20.37	0.00

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

Gaging Station GS01 is located at 39° 52' 40"N, 105° 09' 55"W, at Woman Creek and Indiana Street (See Section 4 Map). This station is a RFCA Point of Compliance, a Buffer Zone Monitoring Location and a monitoring point for water leaving the Site and flowing to Woman Creek Reservoir. This station collects samples for selected radionuclides using continuous flow-paced sampling and storm event sampling for selected water quality parameters, metals, and major ions.

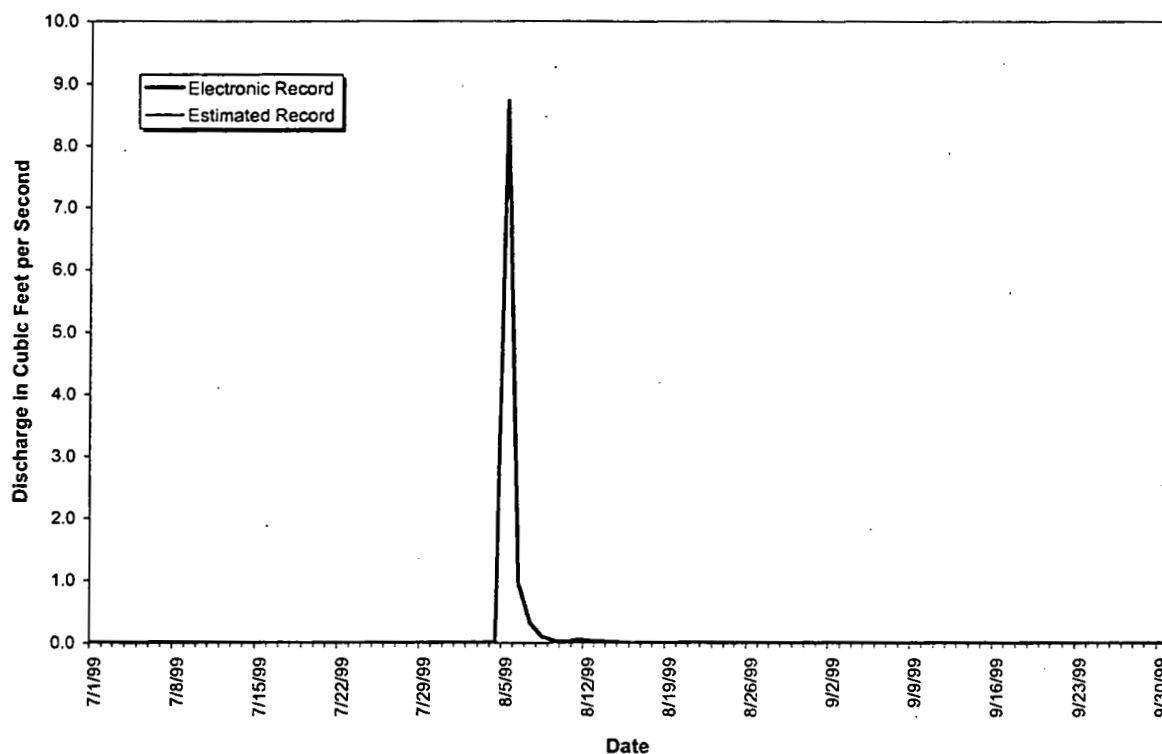


Figure 4-1. Mean Daily Discharge at GS01, Water Year 1999 (July, August, and September)

Table 4-2. Gaging Station GS03: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.016	0.000	2.048
2	0.009	0.000	1.966
3	0.000	0.000	1.571
4	0.000	0.007	1.224
5	0.001	1.022	0.929
6	0.003	2.394	0.653
7	0.003	2.415	0.283
8	0.003	2.323	0.018
9	0.001	1.809	0.010
10	0.000	1.543	0.009
11	0.000	1.553	0.009
12	0.000	1.543	0.010
13	0.000	1.478	0.010
14	0.000	1.252	0.008
15	0.000	0.917	0.006
16	0.000	1.115	0.006
17	0.000	1.095	0.005
18	0.000	0.983	0.006
19	0.000	0.524	0.010
20	0.000	0.020	0.019
21	0.000	0.007	0.012
22	0.000	0.004	0.007
23	0.000	0.003	0.004
24	0.000	0.003	0.003
25	0.000	0.004	0.001
26	0.000	0.003	0.000
27	0.000	0.825	0.000
28	0.000	2.093	0.014
29	0.000	2.094	0.004
30	0.000	2.220	0.001
31	0.000	2.151	NA
Monthly Average (cfs)	0.001	1.013	0.295

Monthly Discharge

Cubic Feet	3241	2713103	764537
Gallons	24247	20295420	5719132
Acre-Feet	0.07	62.27	17.55

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

Gaging Station GS03 is located at 39° 54' 7"N, 105° 9' 59"W, at Walnut Creek and Indiana Street (See Section 4 Map). This station is a RFCA Point of Compliance, a Buffer Zone Monitoring Location and a monitoring point for water leaving the Site and flowing to the Broomfield Diversion Ditch. This station collects samples for selected radionuclides using continuous flow-paced sampling and storm event sampling for selected water quality parameters, metals, and major ions.

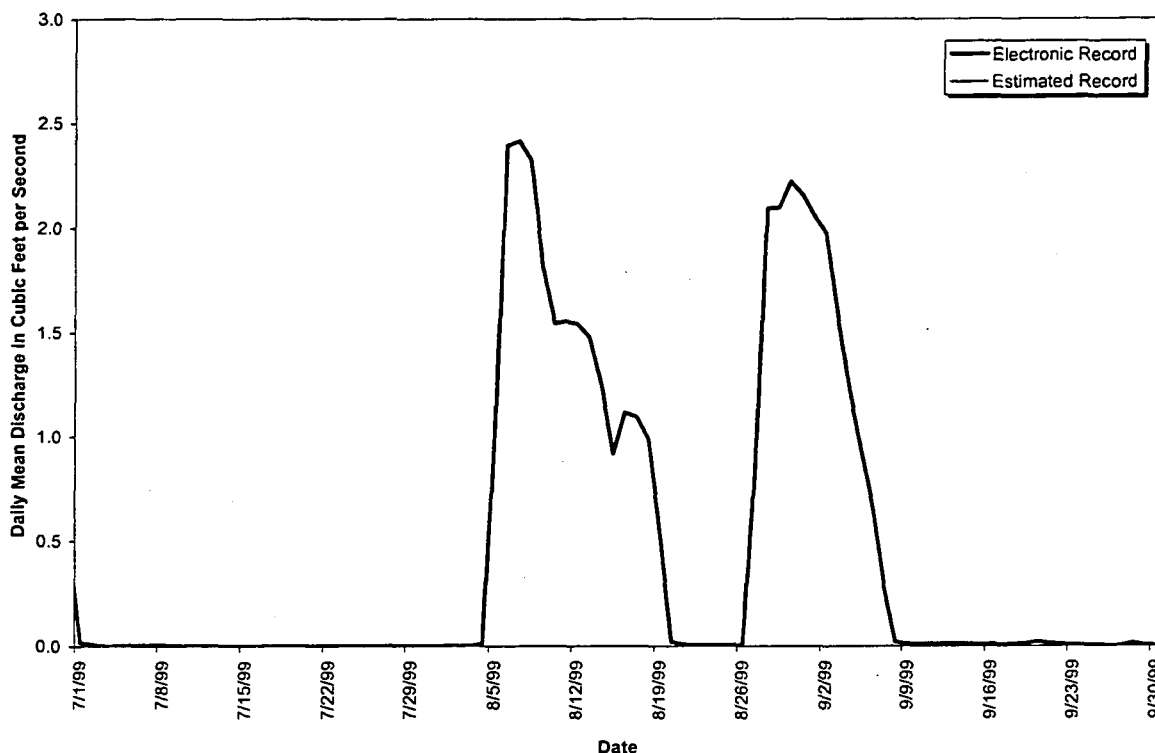


Figure 4-2. Mean Daily Discharge at GS03, Water Year 1999 (July, August, and September)

Table 4-3. Gaging Station GS08: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.000	0.000	0.000
2	0.000	0.000	0.000
3	0.000	0.000	0.000
4	0.000	0.000	0.000
5	0.000	1.327	0.000
6	0.000	2.946	0.000
7	0.000	2.916	0.000
8	0.000	2.897	0.000
9	0.000	2.314	0.000
10	0.000	2.047	0.000
11	0.000	2.075	0.000
12	0.000	2.075	0.000
13	0.000	1.926	0.000
14	0.000	1.657	0.000
15	0.000	1.250	0.000
16	0.000	1.548	0.000
17	0.000	1.468	0.000
18	0.000	1.360	0.000
19	0.000	0.544	0.000
20	0.000	0.000	0.000
21	0.000	0.000	0.000
22	0.000	0.000	0.000
23	0.000	0.000	0.000
24	0.000	0.000	0.000
25	0.000	0.000	0.000
26	0.000	0.000	0.000
27	0.000	0.000	0.000
28	0.000	0.000	0.000
29	0.000	0.000	0.000
30	0.000	0.000	0.000
31	0.000	0.000	NA
Monthly Average (cfs)	0.000	0.915	0.000

Monthly Discharge

Cubic Feet	0	2449464	0
Gallons	0	18323261	0
Acre-Feet	0.00	56.23	0.00

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.



Gaging Station GS08 is located 39° 53' 54"N, 105° 10' 48"W, at the Pond B-5 Outfall on South Walnut Creek (See Section 4 Map). This station is a RFCA Point of Compliance and monitors water discharged from Pond B-5 to South Walnut Creek. This station collects samples for selected radionuclides using continuous flow-paced sampling.

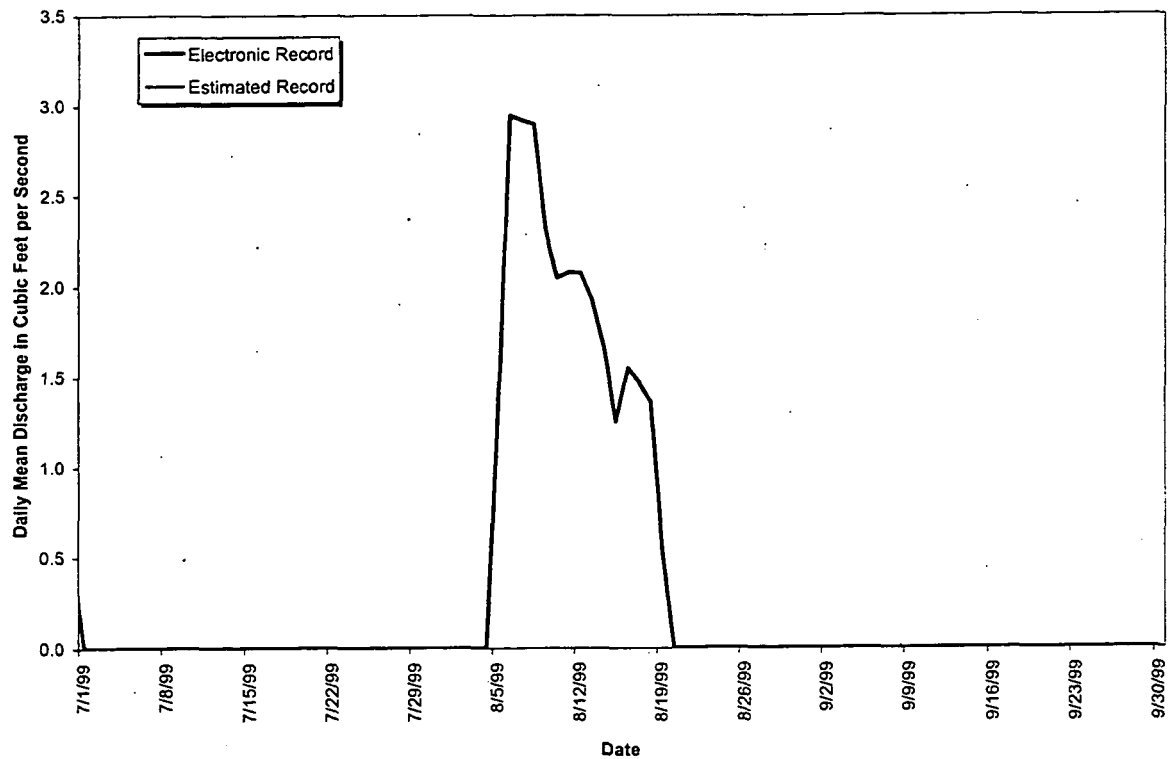


Figure 4-3. Mean Daily Discharge at GS08, Water Year 1999 (July, August, and September)

Table 4-4. Gaging Station GS10: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.062	0.141	0.111
2	0.062	0.180	0.163
3	0.063	0.071	0.067
4	0.072	3.794a	0.053
5	0.076	0.850	0.050
6	0.086	0.107	0.046
7	0.091	0.073	0.044
8	0.090	0.064	0.044
9	0.081	0.067	0.043
10	0.088	0.135	0.054
11	0.102	0.067	0.044
12	0.098	0.060	0.049
13	0.107	0.061	0.041
14	0.126	0.064	0.055
15	0.125	0.066	0.056
16	0.170	0.064	0.054
17	0.121	0.068	0.052
18	0.140	0.062	0.053
19	0.140	0.070	0.138
20	0.144	0.068	0.201
21	0.140	0.070	0.056
22	0.147	0.066	0.055
23	0.140	0.066	0.062
24	0.637a	0.064	0.060
25	0.092	0.066	0.054
26	0.082	0.065	0.054
27	0.077	0.075	0.100
28	0.079	0.188	0.879
29	0.098	0.065	0.171
30	0.459	0.062	0.073
31	3.144a	0.969a	NA
Monthly Average (cfs)	0.230	0.254	0.099

Monthly Discharge

Cubic Feet	616579	681462	257503
Gallons	4612332	5097687	1926257
Acre-Feet	14.15	15.64	5.91

Note: mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS10 is located 39° 53' 35"N, 105° 11' 27"W on South Walnut Creek above the Pond B-1 Bypass (See Section 4 Map). This station is a RFCA Action Level Framework and a New Source Detection Location and monitors water leaving the Site Industrial Area and entering the B-Series Ponds and South Walnut Creek. This station collects samples for selected radionuclides, metals, and water quality parameters using continuous flow-paced sampling.

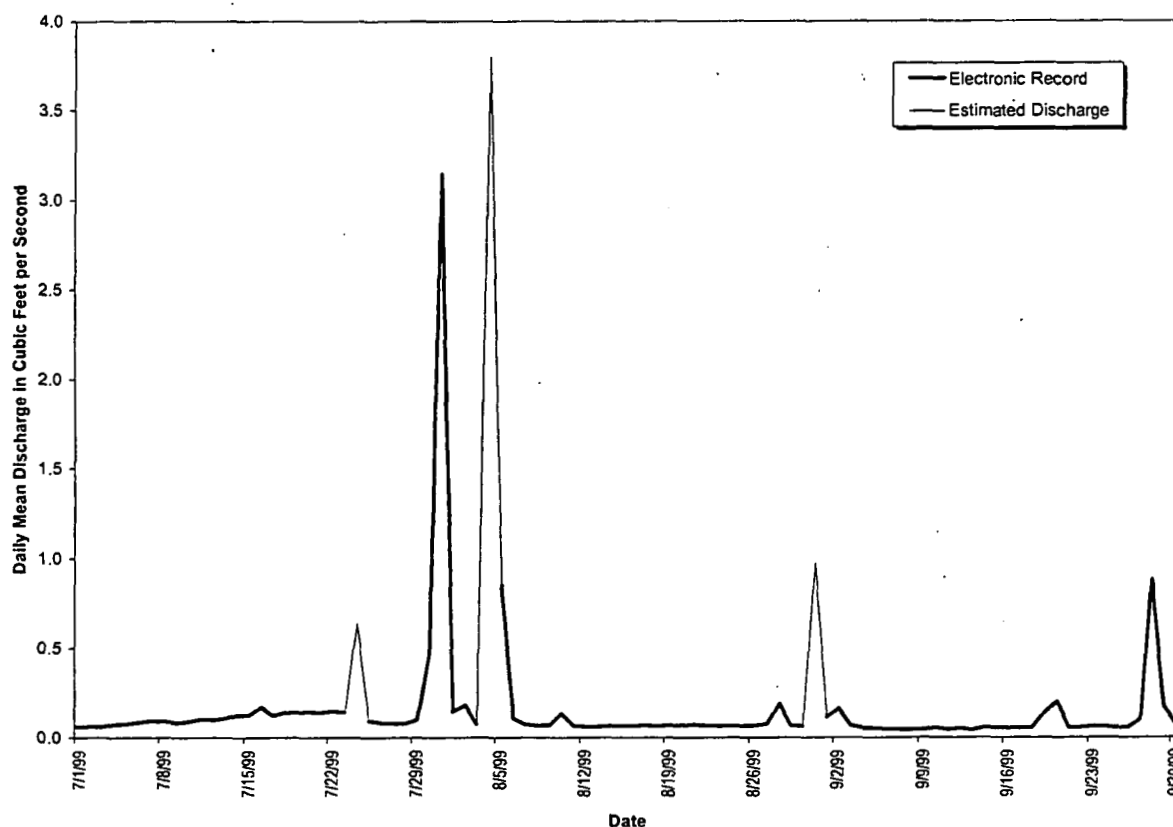


Figure 4-4. Mean Daily Discharge at GS10, Water Year 1999 (July, August, and September)

Table 4-5. Gaging Station GS11: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.000	0.000	2.391
2	0.000	0.000	2.266
3	0.000	0.000	1.839
4	0.000	0.000	1.443
5	0.000	0.000	1.055
6	0.000	0.000	0.659
7	0.000	0.000	0.168
8	0.000	0.000	0.000
9	0.000	0.000	0.000
10	0.000	0.000	0.000
11	0.000	0.000	0.000
12	0.000	0.000	0.000
13	0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	0.000
16	0.000	0.000	0.000
17	0.000	0.000	0.000
18	0.000	0.000	0.000
19	0.000	0.000	0.000
20	0.000	0.000	0.000
21	0.000	0.000	0.000
22	0.000	0.000	0.000
23	0.000	0.000	0.000
24	0.000	0.000	0.000
25	0.000	0.000	0.000
26	0.000	0.000	0.000
27	0.000	1.655	0.000
28	0.000	2.743	0.000
29	0.000	2.620	0.000
30	0.000	2.649	0.000
31	0.000	2.477	NA
Monthly Average (cfs)	0.000	0.392	0.327

Monthly Discharge

Cubic Feet	0	1049206	848549
Gallons	0	7848604	6347586
Acre-Feet	0.00	24.08	19.48

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

Gaging Station GS11 is located 39° 54' 3"N, 105° 10' 47"W, at the Pond A-4 Outfall on North Walnut Creek (See Section 4 Map). This station is a RFCA Point of Compliance and monitors water discharged from Pond A-4 to North Walnut Creek. This station collects samples for selected radionuclides using continuous flow-paced sampling.

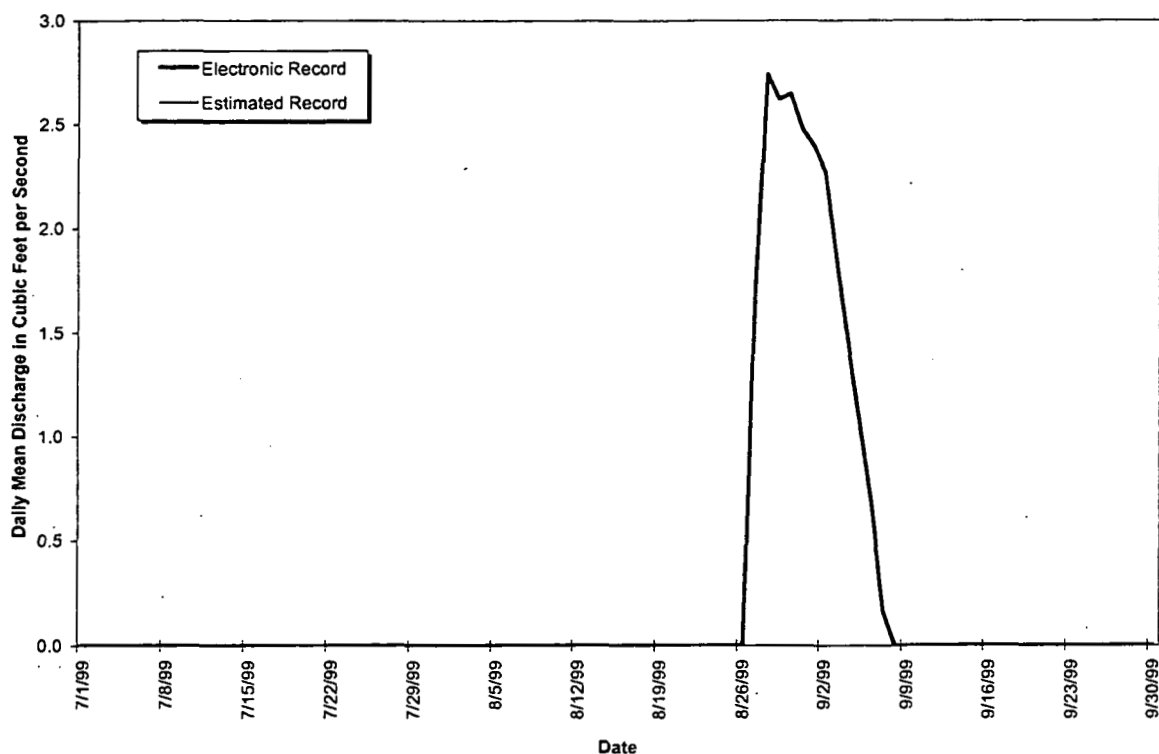


Figure 4-5. Mean Daily Discharge at GS11 Water Year 1999 (July, August, and September)

Table 4-6. Gaging Station GS27: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.0000	0.0000	0.0000
2	0.0000	0.0002	0.0002
3	0.0000	0.0000	0.0000
4	0.0000	0.0141a	0.0000
5	0.0000	0.0015	0.0000
6	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000
10	0.0000	0.0002	0.0000
11	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000
19	0.0000	0.0000	0.0001
20	0.0000	0.0000	0.0006
21	0.0000	0.0000	0.0000
22	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000
24	0.0019	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	0.0000	0.0000
28	0.0000	0.0003	0.0033
29	0.0000	0.0000	0.0000
30	0.0012	0.0000	0.0000
31	0.0076a	0.0033	NA
Monthly Average (cfs)	0.000	0.001	0.000

Monthly Discharge

Cubic Feet	918	1692	355
Gallons	6865	12659	2653
Acre-Feet	0.021	0.039	0.008

Note: mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS27 is located at State Plane 2080529; 751216, at the small drainage ditch NW of Building 884 (see Section 4 Map). This location is a Performance and Best Management Practices Monitoring Location and monitors water draining from the Building 889 area. This station collects samples for selected radionuclides using continuous, flow-paced sampling.

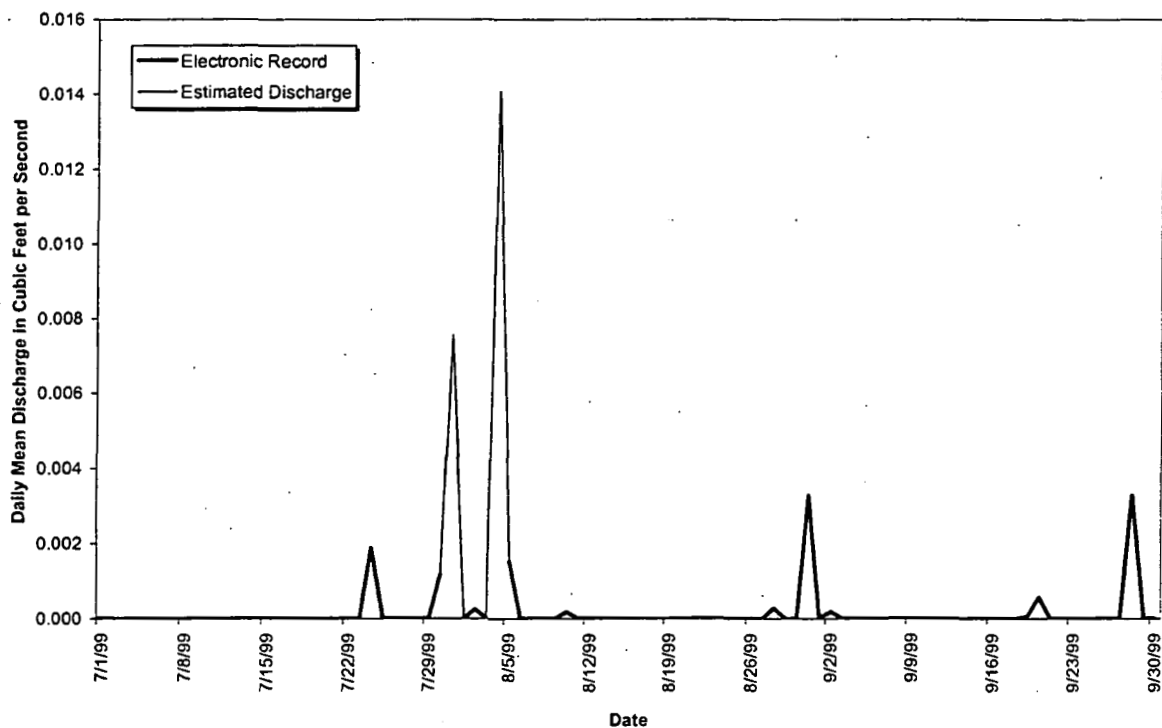


Figure 4-6. Mean Daily Discharge at GS27 Water Year 1999 (July, August, and September)

Table 4-7. Gaging Station GS31: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.000	0.000	0.000
2	0.000	0.000	0.000
3	0.000	0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	0.000	0.000	0.000
7	0.000	0.000	0.000
8	0.000	0.000	0.000
9	0.000	0.000	0.000
10	0.000	0.000	0.000
11	0.000	0.000	0.000
12	0.000	0.000	0.000
13	0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	0.000
16	0.000	0.000	0.000
17	0.000	0.000	0.000
18	0.000	0.000	0.000
19	0.000	0.000	0.000
20	0.000	0.000	0.000
21	0.000	0.000	0.000
22	0.000	0.000	0.000
23	0.000	0.000	0.000
24	0.000	0.000	0.000
25	0.000	0.000	0.000
26	0.000	0.000	0.000
27	0.000	0.000	0.000
28	0.000	0.000	0.000
29	0.000	0.000	0.000
30	0.000	0.000	0.000
31	0.000	0.000	NA
Monthly Average (cfs)	0.000	0.000	0.000

Monthly Discharge

Cubic Feet	0	0	0
Gallons	0	0	0
Acre-Feet	0.00	0.00	0.00

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.



Gaging Station GS31 is located at State Plane 2089268: 747506, at the Pond C-2 Outfall (See Section 4 Map). This station is a RFCA Point of Compliance and monitors water discharged from Pond C-2. This station collects samples for selected radionuclides using continuous flow-paced sampling.

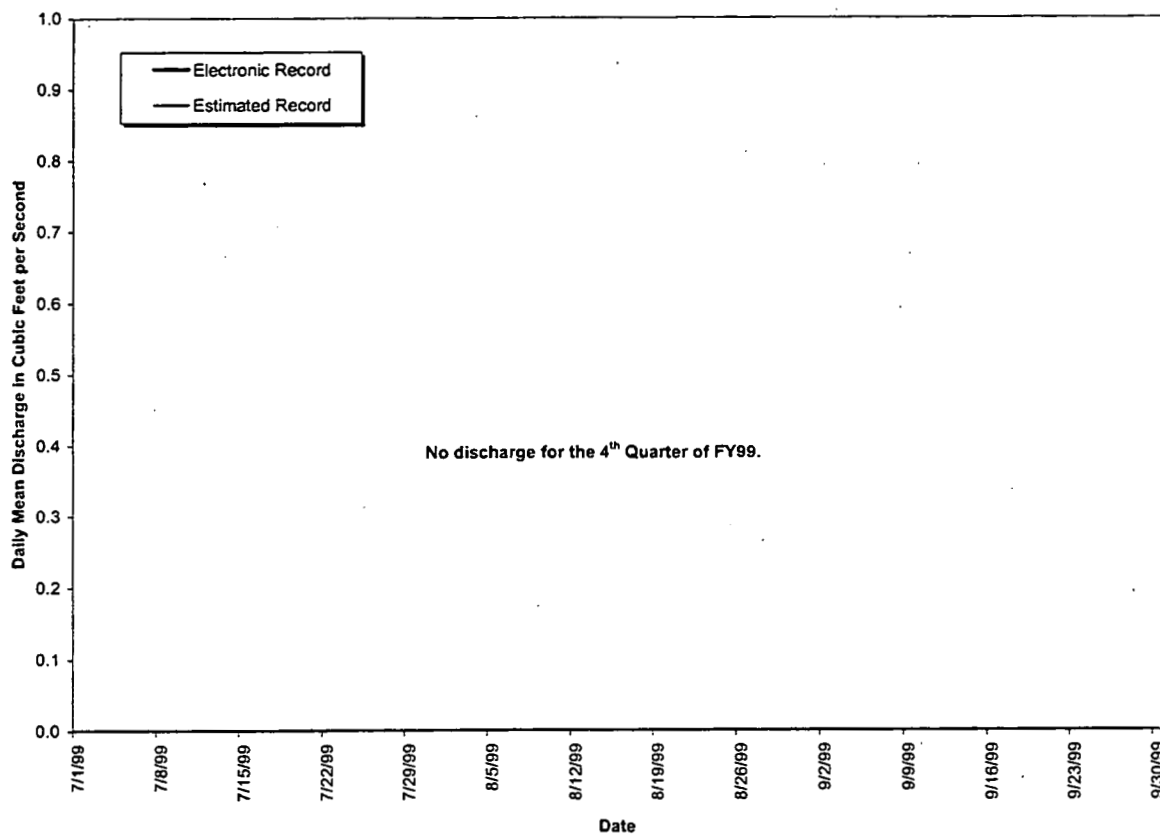


Figure 4-7. Mean Daily Discharge at GS31 Water Year 1999 (July, August, and September)

Table 4-8. Gaging Station GS39: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.0000	0.0017	0.0014
2	0.0000	0.0053	0.0052
3	0.0000	0.0000	0.0001
4	0.0000	0.2013	0.0000
5	0.0000	0.0323	0.0000
6	0.0000	0.0006	0.0000
7	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000
10	0.0000	0.0007	0.0000
11	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000
19	0.0000	0.0000	0.0041
20	0.0000	0.0000	0.0122
21	0.0000	0.0000	0.0000
22	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000
24	0.0201	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	0.0000	0.0011
28	0.0000	0.0049	0.0587
29	0.0000	0.0000	0.0024
30	0.0192	0.0000	0.0000
31	0.1672a	0.0612	NA
Monthly Average (cfs)	0.007	0.010	0.003

Monthly Discharge

Cubic Feet	17850	26632	7366
Gallons	133529	199224	55102
Acre-Feet	0.41	0.61	0.17

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS39 is located in the drainage ditch northwest of the 904 Pad. This location is a RFCA Source Location station monitoring water flowing from the area of the 903 Pad as well as part of the 904 Pad and contractor yard to South Walnut Creek. This station collects samples for selected radionuclides using continuous, flow-paced sampling.

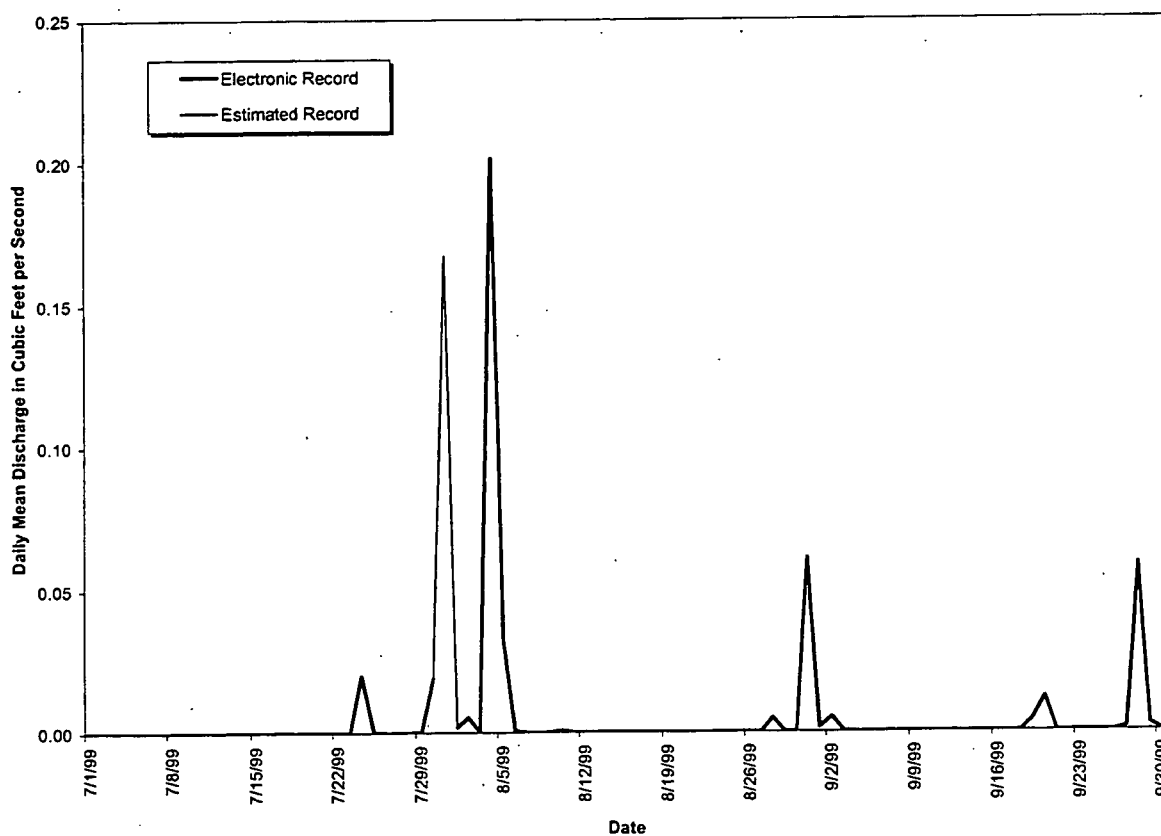


Figure 4-8. Mean Daily Discharge at GS39 Water Year 1999 (July, August, and September)

Table 4-9. Gaging Station GS40: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.040	0.065	0.021
2	0.041	0.118	0.068
3	0.039	0.048	0.017
4	0.042	0.882	0.019
5	0.041	0.223	0.024
6	0.041	0.059	0.029
7	0.038	0.043	0.028
8	0.038	0.044	0.034
9	0.032	0.049	0.036
10	0.034	0.087	0.052
11	0.043	0.031	0.042
12	0.033	0.034	0.050
13	0.039	0.036	0.045
14	0.038	0.038	0.050
15	0.035	0.033	0.052
16	0.078	0.033	0.045
17	0.030	0.035a	0.045
18	0.047	0.028	0.046
19	0.030	0.030	0.122
20	0.033	0.029	0.117
21	0.035	0.035	0.034
22	0.034	0.028	0.037
23	0.032	0.031	0.043
24	0.234	0.034	0.041
25	0.033	0.034	0.038
26	0.032	0.033	0.042
27	0.038	0.045	0.088
28	0.048	0.105	0.301
29	0.073	0.018	0.119
30	0.218	0.023	0.043
31	0.809a	0.299	NA
Monthly Average (cfs)	0.077	0.085	0.058

Monthly Discharge

Cubic Feet	205310	227272	149415
Gallons	1535823	1700115	1117702
Acre-Feet	4.71	5.22	3.43

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS40 is located on the concrete spillway east of Tenth Street, south of Building 997. This location is a RFCA Performance Monitoring Location monitoring water flowing from the 700 area to South Walnut Creek. This station samples for selected radionuclides using continuous, flow-paced sampling.

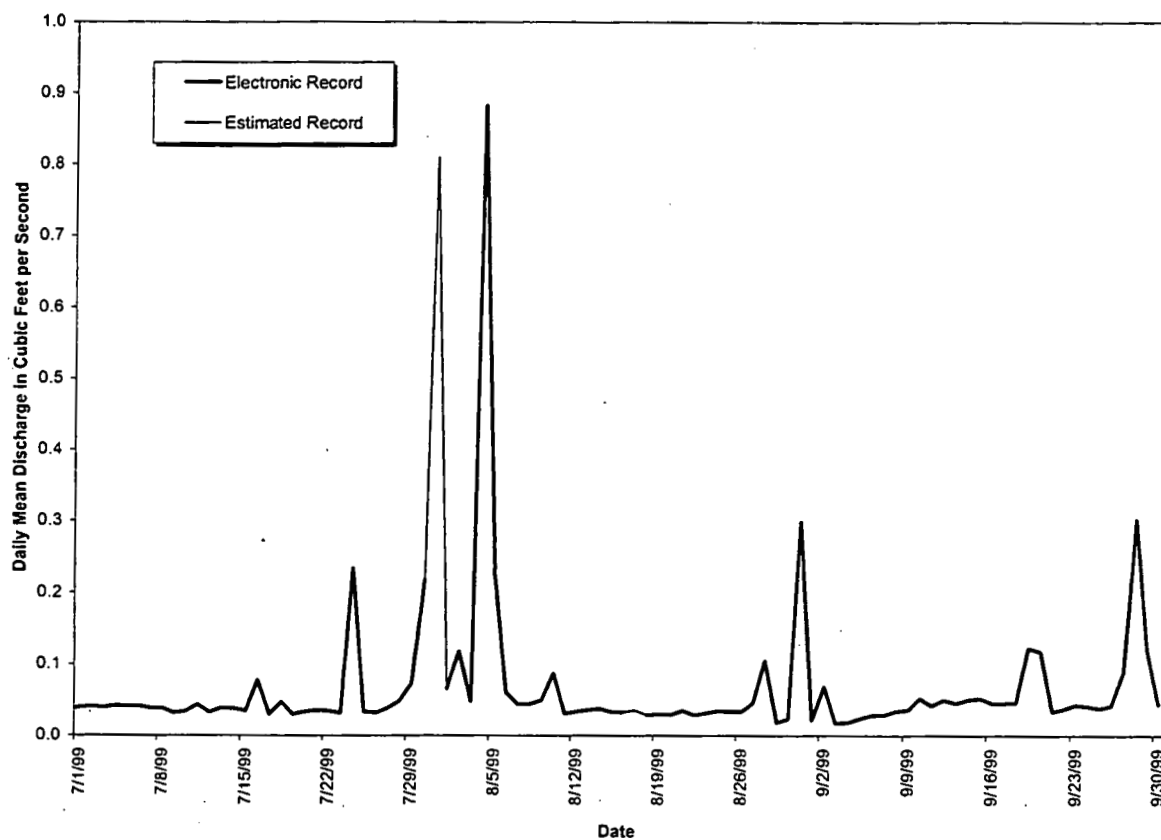


Figure 4-9. Mean Daily discharge at GS40 Water Year 1999 (July, August, and September)

Table 4-10. Gaging Station GS43: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.0000	0.0049	0.0000
2	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000
4	0.0000	0.0060	0.0000
5	0.0000	0.0092	0.0000
6	0.0000	0.0018	0.0000
7	0.0000	0.0002	0.0000
8	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000
16	0.0000	0.0003	0.0000
17	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000
19	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000
21	0.0000	0.0000	0.0000
22	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000
24	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000a	0.0000	0.0000
27	0.0000	0.0000	0.0000
28	0.0000	0.0000	0.0010
29	0.0000	0.0000	0.0005a
30	0.0017	0.0000	0.0000
31	0.0048	0.0000	NA
Monthly Average (cfs)	0.000	0.001	0.000

## Monthly Discharge

Cubic Feet	564	1941	138
Gallons	4216	14523	1035
Acre-Feet	0.01	0.04	0.00

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging station GS43 is located in the ditch at the northeast corner of T886A. This location is a RFCA Performance Monitoring Location monitoring runoff from the eastern portion of the 800 area including Building 875, T886A, and the eastern half of Building 886. Water passing this monitoring location continues to South Walnut Creek. This station samples for selected radionuclides and metals using continuous, flow-paced sampling.

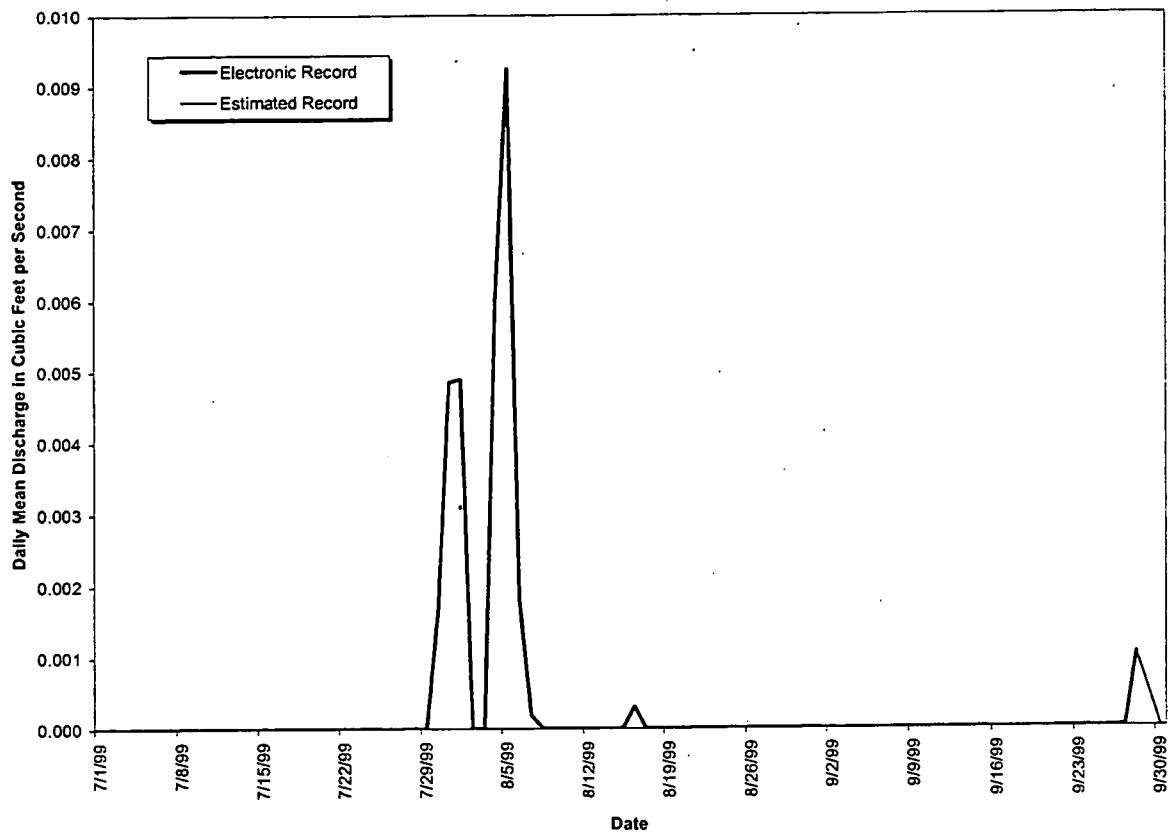


Figure 4-10. Mean Daily Discharge at GS43, Water Year 1999 (July, August, and September)

Table 4-11. Gaging Station SW022: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.0000	0.0284	0.0191
2	0.0000	0.0494	0.0374
3	0.0000	0.0000	0.0013
4	0.0000	1.2884a	0.0000
5	0.0000	0.3845	0.0000
6	0.0000	0.0062	0.0000
7	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000
10	0.0000	0.0111	0.0000
11	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000
19	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0442
21	0.0000	0.0000	0.0000
22	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000
24	0.1670	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	0.0000	0.0000
28	0.0000	0.0000	0.3667
29	0.0000	0.0000	0.0219
30	0.1499	0.0000	0.0000
31	0.9029a	0.3574a	NA
Monthly Average (cfs)	0.039	0.069	0.016

Monthly Discharge

Cubic Feet	105396	183617	42383
Gallons	788418	1373551	317050
Acre-Feet	2.42	4.21	0.97

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.



Gaging Station SW022 is located 39° 53' 30"N, 105° 11' 30"W, at the Central Avenue Ditch at the Inner East Gate (See Section 4 Map). This location is a RFCA New Source Detection Location and monitors water in the Central Avenue Ditch entering the B-Series Ponds and South Walnut Creek. Storm event samples are collected for selected radionuclides.

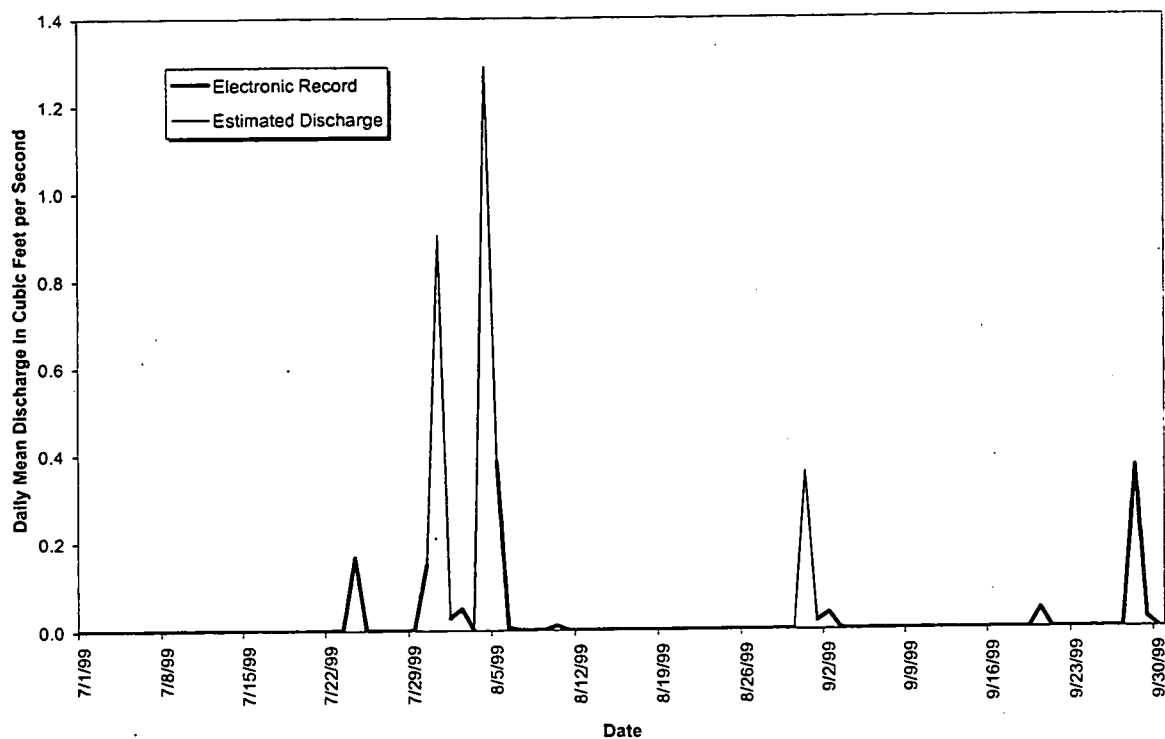


Figure 4-11. Mean Daily Discharge at SW022, Water Year 1999 (July, August, and September)

Table 4-12. Gaging Station SW027: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.000	0.349	0.033
2	0.000	0.009	0.002
3	0.000	0.006	0.001
4	0.000	1.079	0.000
5	0.000	0.773	0.000
6	0.000	0.019	0.000
7	0.000	0.006	0.000
8	0.000	0.004	0.000
9	0.000	0.002	0.000
10	0.000	0.003	0.000
11	0.000	0.002	0.000
12	0.000	0.000	0.000
13	0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	0.000
16	0.000	0.000	0.000
17	0.000	0.000	0.000
18	0.000	0.000	0.000
19	0.000	0.000	0.000
20	0.000	0.000	0.000
21	0.000	0.000	0.001
22	0.000	0.000	0.000
23	0.000	0.000	0.000
24	0.000	0.000	0.000
25	0.000	0.000	0.000
26	0.000	0.000	0.000
27	0.000	0.000	0.000
28	0.000	0.000	0.088
29	0.000	0.000	0.089
30	0.000	0.000	0.035
31	0.394	0.000	NA
Monthly Average (cfs)	0.013	0.073	0.008

Monthly Discharge

Cubic Feet	34023	194455	21513
Gallons	254507	1454626	160926
Acre-Feet	0.78	4.46	0.49

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

Gaging Station SW027 is located 39° 53' 12" N, 105° 11' 4" W, at the South Interceptor Ditch above Pond C-2 (See Section 4 Map). This station is a RFCA Action Level Framework and a New Source Detection Location and monitors water in the South Interceptor Ditch entering Pond C-2. This station collects samples for selected radionuclides, metals, and water quality parameters using continuous flow-paced sampling.

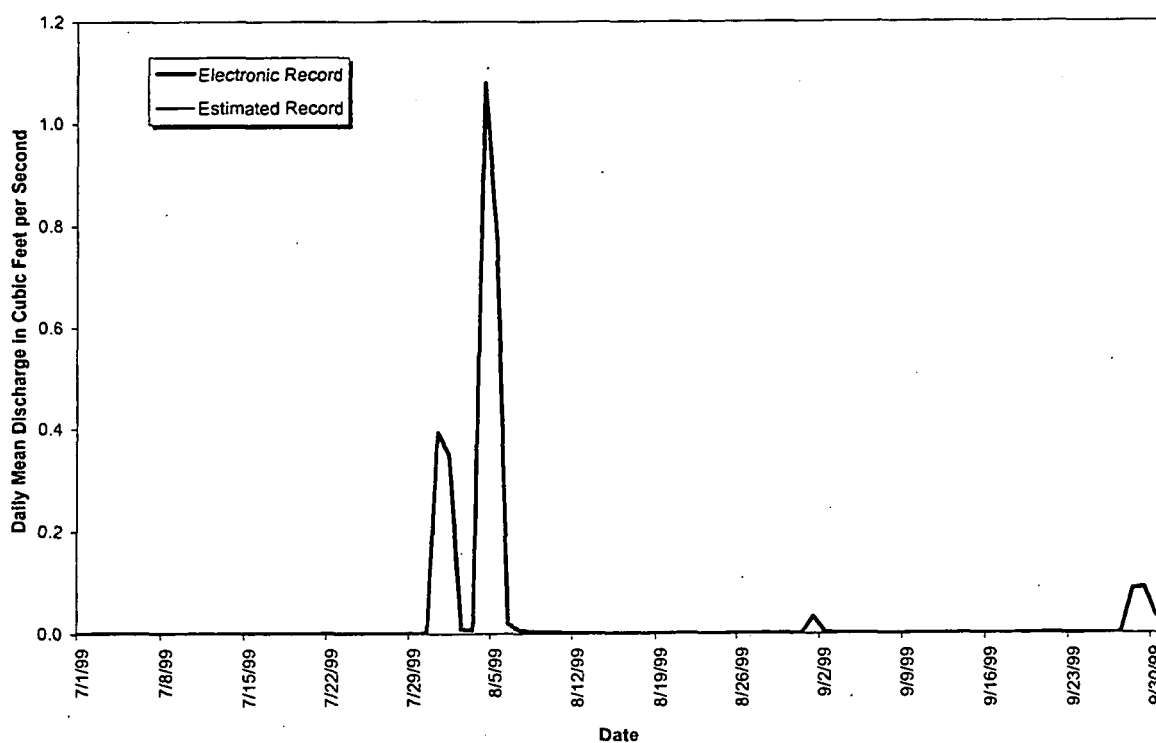


Figure 4-12. Mean Daily Discharge at SW027, Water Year 1999 (July, August, and September)

Table 4-13. Gaging Station SW091: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000
19	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000
21	0.0000	0.0000	0.0000
22	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000
24	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	0.0000	0.0000
28	0.0000	0.0000	0.0000
29	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000
31	0.0001	0.0010	NA
Monthly Average (cfs)	0.0000	0.0000	0.0000

Monthly Discharge

Cubic Feet	6	93	4
Gallons	43	695	30
Acre-Feet	0.00	0.00	0.00

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

Gaging Station SW091 is located at State Plane 2086064; 751322, along the drainage NE of the Solar Ponds draining to the A-Series Ponds (See Section 4 Map). This location is a RFCA New Source Detection Location and monitors water draining from the area NE of the Solar Ponds. Storm event samples are collected for selected radionuclides.

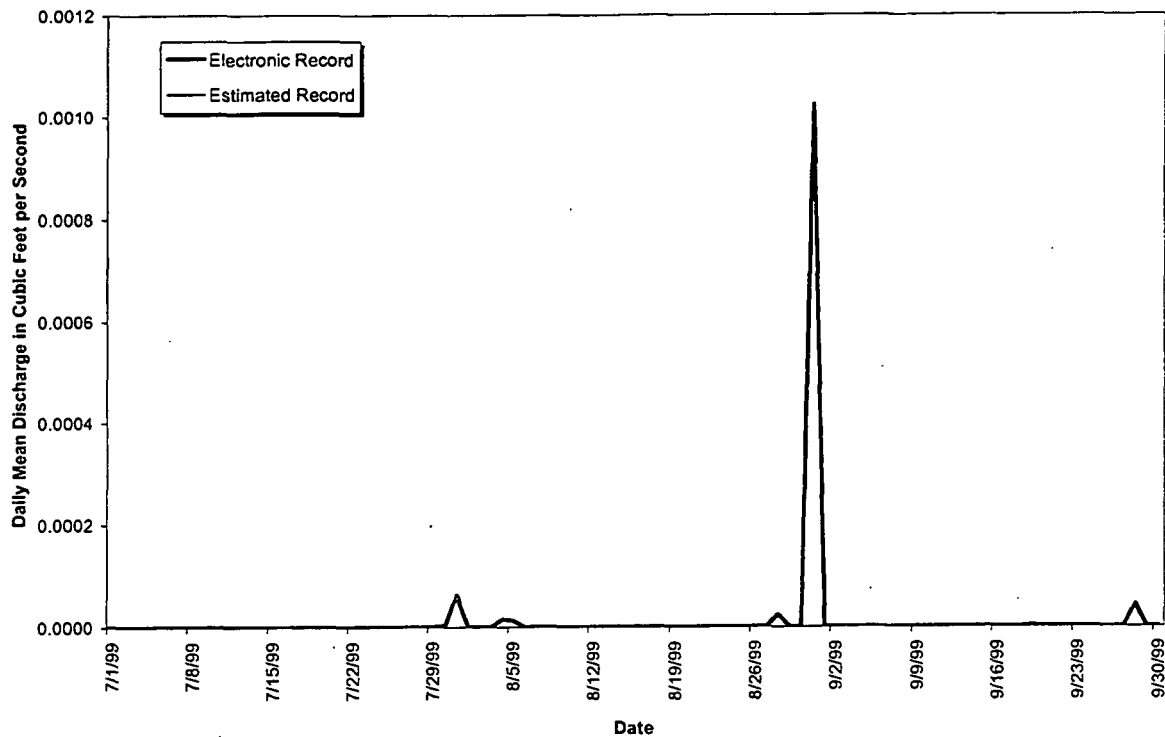


Figure 4-13. Mean Daily Discharge at SW091, Water Year 1999 (July, August, and September)

Table 4-14. Gaging Station SW093: Mean Daily Discharge (cubic feet per second)

Day	July-99	August-99	September-99
1	0.070	0.507	0.235
2	0.066	0.443a	0.288
3	0.066	0.306	0.170
4	0.065	5.364a	0.117
5	0.065	1.480	0.101
6	0.076	0.492	0.093
7	0.071	0.306	0.082
8	0.078	0.240	0.080
9	0.073	0.191	0.080
10	0.069	0.339	0.085
11	0.071	0.206	0.087
12	0.071	0.134	0.106
13	0.069	0.118	0.090
14	0.073	0.113	0.086
15	0.070	0.109	0.088
16	0.148	0.096	0.084
17	0.074	0.100	0.081
18	0.087	0.094	0.081
19	0.072	0.093	0.182
20	0.070	0.098	0.272
21	0.069	0.101	0.106
22	0.074	0.095	0.100
23	0.072	0.088	0.085
24	0.470	0.085	0.086
25	0.104	0.088	0.078
26	0.078	0.091	0.085
27	0.103	0.091	0.141
28	0.109	0.266	0.926
29	0.301	0.108	0.293
30	0.567	0.094	0.153
31	4.386a	0.781	NA
Monthly Average (cfs)	0.253	0.410	0.151

Monthly Discharge

Cubic Feet	677079	1098446	392448
Gallons	5064902	8216948	2935718
Acre-Feet	15.54	25.21	9.01

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station SW093 is located 39° 53' 51"N, 105° 11' 48"W, along North Walnut Creek at the 72" culvert 1000 feet above the Pond A-1 Bypass (See Section 4 Map). This station is a RFCA Action Level Framework and a New Source Detection Location and monitors water leaving the Site Industrial Area and entering the A-Series Ponds and North Walnut Creek. This station collects samples for selected radionuclides, metals, and water quality parameters using continuous flow-paced sampling.

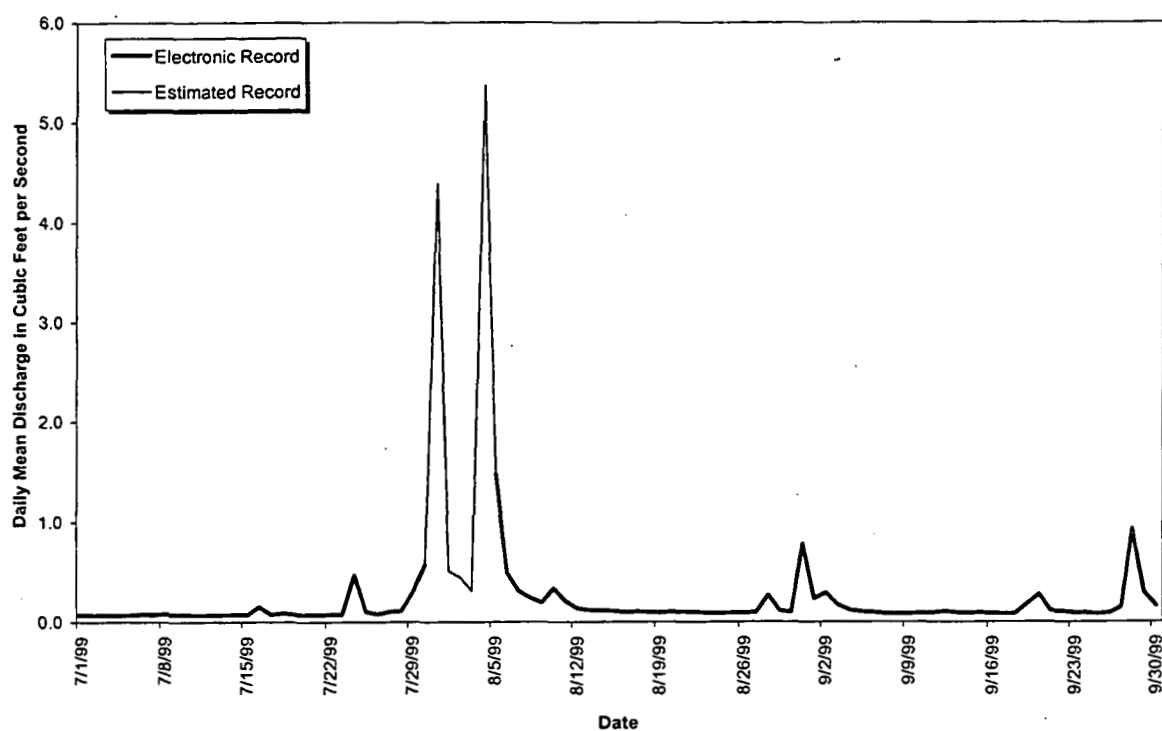


Figure 4-14. Mean Daily Discharge at SW093, Water Year 1999 (July, August, and September)

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## 4.2 WATER QUALITY DATA

Table 4-15. Radionuclides, Water Year 1999 (July, August, and September)

Location	Sample Dates	Result (MDA) Pu-239, -240 [pCi/l]	Result (MDA) Am-241 [pCi/l]	Result (MDA) Total Uranium [pCi/l]	Result (MDA) Tritium [pCi/l]
GS01	6/21 - 8/5/99	0.014 (0.018)	0.002 (0.020)	a	11 (280)
GS01	8/5 - 10/22/99	b	b	a	b
GS03	7/1 - 8/5/99	0.011 (0.018)	0.025 (0.020)	a	130 (280)
GS03	8/5 - 8/9/99	0.010 (0.021)	-0.003 (0.021)	a	170 (280)
GS03	8/9 - 8/13/99	0.005 (0.021)	0.008 (0.022)	a	69 (280)
GS03	8/13 - 8/27/99	0.000 (0.018)	-0.003 (0.021)	a	43 (270)
GS03	8/27 - 8/30/99	-0.002 (0.019)	0.016 (0.024)	a	91 (270)
GS03	8/30 - 9/2/99	0.003 (0.021)	0.000 (0.021)	a	28 (270)
GS03	9/2 - 9/8/99	0.014 (0.020)	-0.004 (0.024)	a	260 (270)
GS03	9/8 - 10/4/99	c	c	a	c
GS08	8/5 - 8/8/99	0.011 (0.011)	0.004 (0.024)	0.73 (0.024)	a
GS08	8/8 - 8/13/99	0.007 (0.028)	0.015 (0.023)	0.65 (0.024)	a
GS08	8/13 - 8/19/99	0.022 (0.023)	0.007 (0.019)	1.09 (0.028)	a
GS10	6/29 - 7/8/99	0.044 (0.020)	0.115 (0.021)	4.10 (0.029)	a
GS10	7/8 - 7/15/99	0.118 (0.021)	0.121 (0.024)	3.30 (0.032)	a
GS10	7/15 - 7/22/99	0.194 (0.032)	0.119 (0.020)	2.59 (0.034)	a
GS10	7/22 - 7/28/99	0.398 (0.022)	0.383 (0.022)	1.77 (0.028)	a
GS10	7/28 - 8/1/99	0.502 (0.024)	0.206 (0.022)	1.18 (0.026)	a
GS10	8/1 - 8/4/99	0.104 (0.020)	0.088 (0.020)	0.77 (0.026)	a
GS10	8/4 - 8/31/99	0.008 (0.012)	0.03 (0.012)	1.59 (0.043)	a
GS10	8/31 - 9/4/99	0.062 (0.020)	0.093 (0.023)	1.00 (0.026)	a
GS10	9/4 - 9/20/99	-0.002 (0.014)	0.025 (0.013)	2.26 (0.022)	a
GS10	9/20 - 10/1/99	0.007 (0.027)	0.048 (0.024)	1.44 (0.027)	a
GS11	8/27 - 8/30/99	0.002 (0.016)	-0.008 (0.012)	0.82 (0.044)	a
GS11	8/30 - 9/2/99	0.001 (0.021)	0.015 (0.023)	1.42 (0.028)	a
GS11	9/2 - 9/7/99	0.003 (0.020)	-0.004 (0.023)	1.50 (0.026)	a
GS27	7/24/99	22.9 (0.020)	2.54 (0.019)	0.76 (0.077)	a
GS27	8/28/99	0.118 (0.014)	0.155 (0.013)	1.06 (0.052)	a

- a Not applicable  
b Incomplete laboratory analysis  
c Non-sufficient quantity

Table 4-15. Radionuclides, Water Year 1999 (July, August, and September), continued

Location	Sample Dates	Result (MDA) Pu-239, -240 [pCi/l]	Result (MDA) Am-241 [pCi/l]	Result (MDA) Total Uranium [pCi/l]	Result (MDA) Tritium [pCi/l]
GS32	7/24/99	11.5 (0.026)	3.96 (0.022)	1.30 (0.029)	a
GS32	7/31/99	5.87 (0.020)	3.45 (0.020)	2.09 (0.042)	a
GS32	8/28/99	1.13 (0.021)	1.12 (0.021)	0.81 (0.031)	a
GS32	9/2/99	1.46 (0.021)	0.944 (0.021)	1.01 (0.033)	a
GS39	6/15 - 8/2/99	0.135 (0.019)	0.039 (0.023)	a	a
GS39	8/2 - 8/4/99	0.059 (0.019)	0.023 (0.020)	a	a
GS39	8/4 - 8/27/99	0.041 (0.028)	-0.007 (0.019)	a	a
GS39	8/27 - 10/7/99	0.049 (0.024)	0.006 (0.024)	a	a
GS40	6/29 - 7/27/99	0.032 (0.019)	0.069 (0.021)	a	a
GS40	7/27 - 8/5/99	0.009 (0.019)	0.049 (0.019)	a	a
GS40	8/5 - 9/7/99	0.008 (0.023)	-0.002 (0.008)	a	a
GS40	9/7 - 10/14/99	b	b	a	a
GS43	6/4 - 7/30/99	0.009 (0.019)	0.008 (0.022)	a	a
GS43	7/30 - 8/4/99	0.018 (0.018)	0.007 (0.020)	a	a
GS43	8/4 - 8/5/99	-0.001 (0.021)	-0.005 (0.020)	a	a
GS43	8/5/1999 -	d	d	a	a
SW022	7/24/99	0.968 (0.022)	0.084 (0.021)	1.28 (0.029)	a
SW022	7/30/99	-0.001 (0.023)	0.008 (0.022)	0.32 (0.025)	a
SW022	8/4/99	0.118 (0.021)	0.029 (0.019)	0.86 (0.027)	a
SW022	8/31/99	0.121 (0.013)	0.152 (0.011)	3.10 (0.052)	a
SW022	9/20/99	0.009 (0.018)	0.013 (0.013)	0.29 (0.022)	a
SW027	6/18 - 8/1/99	0.011 (0.020)	0.008 (0.022)	0.23 (0.024)	a
SW027	8/1 - 8/5/99	0.031 (0.020)	0.002 (0.021)	0.41 (0.026)	a
SW027	8/5 - 10/21/99	b	b	b	a
SW093	7/2 - 7/15/99	0.005 (0.021)	-0.003 (0.027)	4.30 (0.027)	a
SW093	7/15 - 7/26/99	0.312 (0.021)	0.069 (0.023)	2.54 (0.029)	a
SW093	7/26 - 8/1/99	0.271 (0.022)	0.188 (0.022)	1.13 (0.025)	a
SW093	8/1 - 8/4/99	0.081 (0.022)	0.006 (0.019)	0.81 (0.027)	a
SW093	8/4 - 8/31/99	0.003 (0.014)	0.004 (0.011)	1.82 (0.041)	a
SW093	8/31 - 9/4/99	0.051 (0.020)	0.037 (0.022)	1.22 (0.027)	a
SW093	9/4 - 9/16/99	0.017 (0.016)	0.003 (0.012)	3.20 (0.024)	a
SW093	9/16 - 10/1/99	0.005 (0.039)	0.001 (0.024)	1.99 (0.028)	a

- a Not applicable  
b Incomplete laboratory analysis  
c Not collected  
d Composite sample in progress

Table 4-16. POE Metals, Water Year 1999 (July, August, and September)

Location	Sample Dates	Analyte Be ug/L	Analyte Dissolved Cd ug/L	Analyte Cr ug/L	Analyte Dissolved Ag ug/L
GS10	6/29 - 7/8/99	0.07	0.14	0.83	<0.25
GS10	7/8 - 7/15/99	0.12	0.09	1.6	<0.25
GS10	7/15 - 7/22/99	0.06	<0.08	2	<0.25
GS10	7/22 - 7/28/99	0.45	<0.08	10.5	<0.25
GS10	7/28 - 8/1/99	0.5	<0.08	7.5	<0.25
GS10	8/1 - 8/4/99	0.25	<0.08	5.9	<0.25
GS10	8/4 - 8/31/99	0.08	<0.08	2.4	<0.25
GS10	8/31 - 9/4/99	0.24	0.12	5.6	<0.25
GS10	9/4 - 9/20/99	0.03	0.08	0.36	<0.25
GS10	9/20 - 10/1/99	0.09	0.17	3.3	<0.25
SW027	6/18 - 8/1/99	<0.04	0.04	1.4	<0.25
SW027	8/1 - 8/5/99	0.09	0.08	2.2	0.68
SW027	8/5 - 10/21/99	a	a	a	a
SW093	5/24 - 6/8/99	<0.04	<0.08	0.6	<0.25
SW093	6/8 - 6/14/99	0.19	v	4.8	<0.25
SW093	6/14 - 6/16/99	0.24	0.22	6.1	<0.25
SW093	6/16 - 6/24/99	0.04	0.09	0.75	1.9
SW093	6/24 - 7/2/99	<0.04	<0.08	0.43	<0.25
SW093	7/2 - 7/15/99	0.05	<0.08	0.28	<0.25
SW093	7/15 - 7/26/99	0.4	0.79	8.6	0.31
SW093	7/26 - 8/1/99	0.95	<0.08	17.8	<0.25
SW093	8/1 - 8/4/99	0.41	0.08	8.4	<0.25
SW093	8/4 - 8/31/99	0.22	<0.08	5.2	<0.25
SW093	8/31 - 9/4/99	0.19	0.17	4.6	<0.25
SW093	9/4 - 9/16/99	<0.04	<0.08	0.76	<0.25
SW093	9/16 - 10/1/99	0.17	0.17	5	<0.25

a Incomplete laboratory analysis

Table 4-17. Other Metals Water Year 1999 (July, August, and September)

Analyte ug/l	Result GS32, 7/24/99	Result GS32, 7/31/99	Result GS32, 8/28/99	Result GS32, 9/2/99
Aluminum	16600	2970	13400	7920
Antimony	5.3	1.1	15.7	11.3
Arsenic	8.6	3.5	6.5	5.3
Barium	307	158	140	92.7
Beryllium	1.4	0.63	0.79	0.51
Cadmium	4.8	3.2	2.4	1.8
Calcium	142000	85500	45800	28800
Chromium	31.8	6.6	23.5	14.6
Cobalt	12.7	7.5	6.2	4.1
Copper	114	54.6	109	90.5
Iron	19400	2980	15000	9380
Lead	63.5	36.2	32.5	20.5
Lithium	44.4	6.8	19	13.5
Magnesium	7680	3000	4730	3300
Manganese	766	466	304	204
Mercury	<0.10	<0.10	<0.10	<0.10
Molybdenum	1.7	0.48	2.0	1.4
Nickel	25.2	9.2	15.1	10.1
Potassium	8670	3560	6900	5720
Selenium	<0.92	<0.92	<0.92	<0.92
Silver	<0.25	<0.25	0.3	<0.25
Sodium	13700	7610	14800	14500
Strontium	195	112	102	69.4
Thallium	<1.3	<1.3	<1.3	<1.3
Tin	1.3	<0.52	0.6	<0.52
Vanadium	51.9	16.2	35	22.7
Zinc	1670	991	602	499

Table 4-17. Other Metals Water Year 1999 (July, August, and September), continued

Analyte ug/l	Result SW022, 7/24/99	Result SW022, 7/30/99	Result SW022, 8/4/99	Result SW022, 8/31/99
Aluminum	9920	484	2880	9730
Antimony	11	55.7	6.5	4.2
Arsenic	4.1	1.6	2.6	4.0
Barium	97.6	41.3	53	83.2
Beryllium	0.61	0.08	0.15	0.58
Cadmium	0.73	0.15	0.32	0.49
Calcium	17000	19400	19600	19700
Chromium	136	1.3	4.3	13.6
Cobalt	3.8	0.31	0.96	3.8
Copper	25.5	7.1	8.7	17.1
Iron	10200	411	2760	10200
Lead	18.6	1.6	5.2	10.1
Lithium	9.8	2.9	4.4	9.3
Magnesium	3860	3090	3670	2970
Manganese	210	21	62.3	171
Mercury	<0.10	<0.10	<0.10	<0.10
Molybdenum	1.3	0.93	0.77	0.94
Nickel	10.1	1.9	3.4	10.1
Potassium	8780	6140	3480	4840
Selenium	<0.92	<0.92	<0.92	<0.92
Silver	<0.25	<0.25	<0.25	<0.25
Sodium	6040	12700	11300	7860
Strontium	67.6	105	112	54.9
Thallium	<1.3	<1.3	<1.3	<1.3
Tin	0.7	<0.52	0.7	<0.52
Vanadium	25	3.7	8.3	24.1
Zinc	176	42	75.3	64.2

Table 4-17. Other Metals Water Year 1999 (July, August, and September), continued

Analyte ug/l	Result SW022, 9/20/99
Aluminum	320
Antimony	48.2
Arsenic	1.5
Barium	28.8
Beryllium	U
Cadmium	0.23
Calcium	15200
Chromium	0.8
Cobalt	0.15
Copper	4.9
Iron	28
Lead	2.6
Lithium	2.1
Magnesium	2520
Manganese	7.9
Mercury	<0.10
Molybdenum	0.45
Nickel	1.0
Potassium	3270
Selenium	<0.92
Silver	<0.25
Sodium	10200
Strontium	83.6
Thallium	<1.3
Tin	<0.52
Vanadium	2.2
Zinc	27.1

Table 4-18. Water Quality Parameters, Water Year 1999 (July, August, and September)

Location	Sample Dates	Analyte Hardness mg/L
GS10	6/29 - 7/8/99	220
GS10	7/8 - 7/15/99	220
GS10	7/15 - 7/22/99	200
GS10	7/22 - 7/28/99	130
GS10	7/28 - 8/1/99	68
GS10	8/1 - 8/4/99	55
GS10	8/4 - 8/31/99	130
GS10	8/31 - 9/4/99	75
GS10	9/4 - 9/20/99	180
GS10	9/20 - 10/1/99	110
SW027	6/18 - 8/1/99	56
SW027	8/1 - 8/5/99	72
SW027	8/5 - 10/21/99	a
SW093	7/2 - 7/15/99	310
SW093	7/15 - 7/26/99	210
SW093	7/26 - 8/1/99	76
SW093	8/1 - 8/4/99	67
SW093	8/4 - 8/31/99	90
SW093	8/31 - 9/4/99	110
SW093	9/4 - 9/16/99	290
SW093	9/16 - 10/1/99	170

a Incomplete laboratory analysis

## 5. INCIDENTAL WATERS

### 5.1 INCIDENTAL WATERS DEFINITION AND ROUTING MATRIX

An incidental water is defined as precipitation, surface water, groundwater, utility water, process water, or waste water collecting in one or more of several types of containments. These containments can include excavation sites, foundation drains, secondary containment berms, electrical vaults, utility pits and manholes, or other natural or manmade depressions, which must be dewatered.

Water collected in this manner has the potential to become contaminated via contact with the surrounding containment material. Sampling and disposition of incidental waters is conducted per Site Procedure 1-C91-EPR-SW.01, *Control and Disposition of Incidental Waters*. Incidental waters are typically sampled for pH, nitrates, conductivity, and gross alpha and gross beta (when radionuclides are suspected). Additional testing for volatile organic compounds and metals is performed when a specific potential contaminant source is known to exist. Disposition depends on the analytical results. Routing options for incidental waters are outlined in the following table.

Table 5-1. Incidental Waters Routing Matrix

Incidental Water Routing	Routing Criteria	Treatment Processes
Ground/Storm Drain	<ul style="list-style-type: none"> <li>Water meets discharge limits per Incidental Waters procedure</li> </ul>	N/A
Building 995 Waste Water Treatment Plant (WWTP)	<ul style="list-style-type: none"> <li>Water above discharge to ground limits</li> <li>Water meets Internal Waste Streams Program review criteria</li> </ul>	Activated Sludge w/ tertiary clarifiers Dual media filtration UV disinfection
Building 891 Consolidated Water Treatment Facility (CWTF)	<ul style="list-style-type: none"> <li>Water above discharge to ground limits</li> <li>Water not accepted by WWTP</li> <li>Water meets CWTF acceptance criteria and has both radionuclide and organic constituents</li> </ul>	Chemical precipitation Microfiltration UV/ peroxide oxidation Granular activated carbon Ion exchange
Building 374	<ul style="list-style-type: none"> <li>Water above discharge to ground limits</li> <li>Water not accepted by WWTP</li> <li>Water has radionuclides, but no organic constituents</li> </ul>	Flash evaporation (Steam-heated reactor with spray evaporation)



## 5.2 QUARTERLY INCIDENTAL WATER DISPOSITIONS

Thirty-two (32) incidental waters were sampled and dispositioned during the fourth quarter of FY99. The majority of these were associated with routine Site activities, such as de-watering transformer berms, and accessing utility manholes. The following table summarizes the location and route of disposal for those incidental waters sampled:

Table 5-2. Quarterly Incidental Water Dispositions FY1999 (July, August, and September)

Location/ Building	Location Type	# of Incidental Waters	Route of Disposal
111	Building Pit	1	Discharge to Ground
132	Secondary Containment	1	Treatment
662	Drum	1	Discharge to Ground
865	Cooling Tower	1	Discharge to Ground
875	Foundation Drain	1	Discharge to Ground
886	Electrical Pit	1	Discharge to Ground
886	Foundation Drain	1	Discharge to Ground
984	Excavation	3	Discharge to Ground
991	Secondary Containment	1	Treatment
991	Tank	1	Treatment
IA	Utility Manholes	8	Treatment - (3); Discharge to Ground - (5)
Buffer Zone	Transformer Berm	12	Treatment - (1); Discharge to Ground - (11)

The incidental waters requiring treatment were dispositioned to the following Site treatment facilities discussed previously:

- Building 995 – WWTP                      2
- Building 891 – CWTF                      3
- Building 374                                      2